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# The CANADIAN FIELD-NATURALIST

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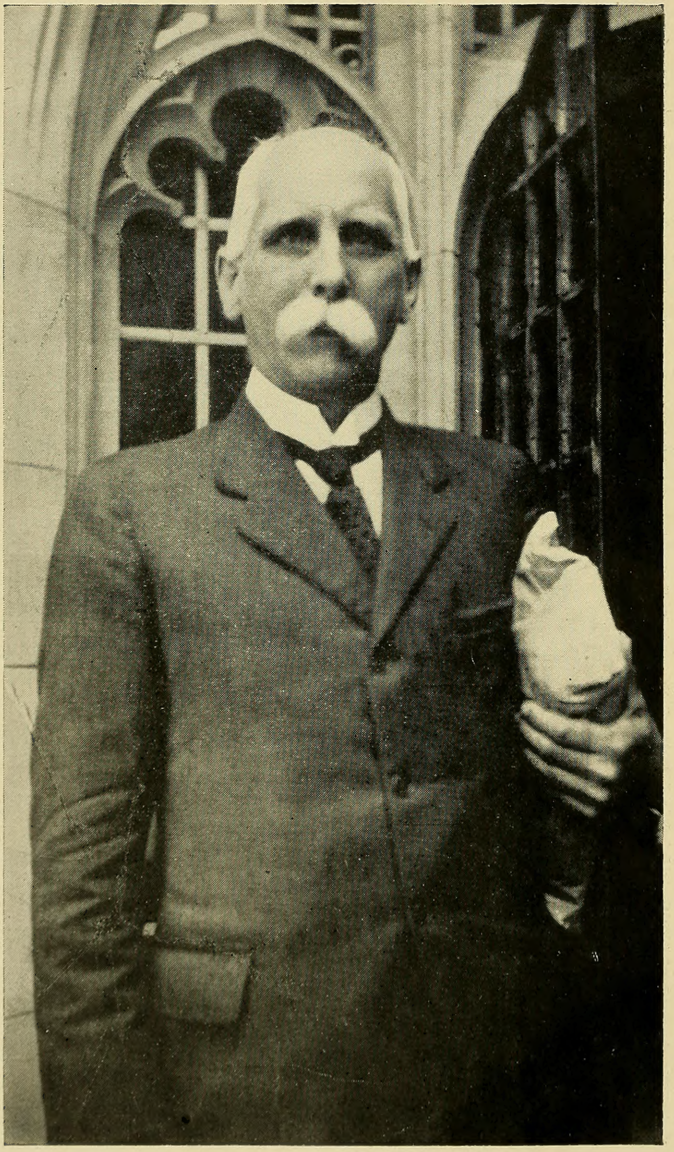

Edward Ernest Prince
1858 - 1936

The Canadian Field-Naturalist

VOL. 59 SUTTON WEST, CANADA JANUARY-FEBRUARY, 1945 No. 1

# EDWARD ERNEST PRINCE 1858 - 1936[1]

*By* A. G. HUNTSMAN
*University of Toronto*

THE "GENIAL PROFESSOR PRINCE", as he was everywhere termed, was a striking official figure in Ottawa as Commissioner of Fisheries from his arrival from Scotland in 1893 to his retirement in 1924, a period of thirty-one years. He was generally known throughout the whole of Canada, from having made many official trips to the various districts with important fisheries, as well as from having served as chairman on various fishery commissions, which held sittings for the taking of evidence in very many places. He was a great favourite everywhere. The wide extent and great variety of his activities can best be appreciated from Dr. Duncan Campbell Scott's "skeleton record" of his life in the Proceedings of the Royal Society of Canada for 1937.

As a schoolboy, he was already a naturalist. It is said that, when only fifteen years old, he won with a paper on the newt a prize offered by the Philosophical and Literary Society of Leeds, England, where he was born. To make himself look older when he had to present it to such a learned audience, he purchased and wore a pair of plain glass spectacles!

He was so bent on scientific knowledge that, eschewing his father's business, he managed, through bursaries, to take the undergraduate course at St. Andrew's University, Scotland, from 1880 to 1884, with later experience at Edinburgh and Cambridge Universities. In 1885 he became Naturalist at the small St. Andrew's Marine Laboratory, which had been recently started under an arrangement with the Fishery Board for Scotland. There he was initiated by Prof. W. C. M'Intosh into the wonders of discovering to what kinds of fishes the various eggs found floating in the sea or attached to the bottom belonged and how they developed. He began publishing his discoveries, briefly at the Aberdeen meeting of the British Association for the Advancement of Science in 1885 and in fuller form in the Annals of Natural History, but the most thorough account was in a lengthy paper with M'Intosh in the Transactions of the Royal Society of Edinburgh. He was made a Fellow of the Linnaean Society in 1888.

His flair for clear and attractive presentation of scientific matters resulted in an article on "St. Andrew's Marine Laboratory — an hour in a scientific laboratory on the Scottish coast" in McMillan's English Illustrated Magazine in 1889, with illustrations signed by a staff artist, Holland Tringham, but really the work of the sister of the young lady who became Mrs. Prince in 1894. Popular articles of his on marine animals appeared in Longman's Magazine and in the National Observer from 1890 to 1892.

In 1890 he was appointed Professor of Zoology and Comparative Anatomy in the Faculty of Medicine of the recently incorporated St. Mungo's College at Glasgow. There he became active in the local Natural History Society, reading short papers, exhibiting interesting specimens, and becoming a Vice-President. He also took an interest in the Andersonian Naturalist's Society of Anderson's College and became its President. At the same time, he had been having experience with fisheries problems, not only in Scotland, but under the Northern Fishery Council in England, and on the west coast of Ireland in government employ.

In 1892, the Canadian fisheries service was reorganized, with abolition of the Deputy-Ministership and combination of Fisheries with Marine under a common Deputy-Minister. Canada decided to get a fishery scientist and at that time, as Michael Graham states ("The Fish Gate", 1943), M'Intosh of St.

---

[1] —The photograph of Professor Prince is published through the courtesy of Science Service, Washington, D.C.

Vol. 58, No. 6, November-December, 1944, was issued May 18, 1945.

Andrews "was the most prominent fishery scientist" and was developing fishery investigations of outstanding character in connection with the recently formed Fishery Board for Scotland. His laboratory "turned out a series of remarkable scientists, who obtained responsible positions all over the world" (Graham), and one of these, Professor Prince, was selected to be scientific adviser to Canada's fishery service with the titles of Commissioner and General Inspector of Fisheries.

That in his new position he retained the title of Professor was the visible evidence that he considered himself to be the expositor of the academic and scientific point of view in its application to the fisheries. Nevertheless, he was drawn into purely administrative office work in addition to the duties of chairman for various Commissions. The latter made the situation so acute that it was rectified in 1909 by reorganization of the service, which permitted him to devote his full time to the scientific side, including the work of the investigating Commissions. The latter dealt with the fisheries of particular regions or for particular species, such as the lobster and the shad. He for Canada and Starr Jordan for the United States formed under the treaty of 1907 the International Fisheries Commission, which had the duty of investigating and framing regulations for the fisheries of all the waters contiguous to the international boundary.

As shown by his appointment, those in authority were ready for scientific study of the fisheries. Faced with Canada's enormous fishery problems, and with duties permitting him but little time for detailed personal investigation, he at once advocated with enthusiasm, in an official report, "A marine scientific station for Canada", in order to develop a seaside laboratory like the one with which he had been associated in Scotland. Canadian scientists were already eager for such a thing, which came into being in 1899 at St. Andrews, New Brunswick. He was its Director, and also Chairman of the Board of Management. From the latter developed the Biological Board of Canada, with Pacific and Great Lakes stations as well as the original Atlantic one. He continued to take a prominent part in its activities as Chairman until 1921 and as Secretary until his retirement.

From the start of his work, he exercised his skill in word picturization in articles connecting science with fisheries. The annual fishery "blue book" contained a new series of "Special Appended Reports" from his pen, of which there were thirty-nine from the report for 1893 to that for 1908. He was naturally the editor of the marine station's publication "Contributions to Canadian Biology", the first issue of which appeared as a "blue book" in 1901. He wrote a preface to each issue, which frequently contained a separate summary for each paper to place it in its proper setting. He even wrote an eight page article for the second issue as "An abbreviated popular résumé..........divested as far as possible of technical phraseology" of "laborious researches" of his colleague, Professor Macallum, "on the inorganic composition of certain marine jelly-fishes or medusae", fundamental results for which the latter is still universally quoted.

In 1894, he became a member of the Ottawa Field-Naturalists' Club, was at once given committee work, was President from 1897 to 1899, and Associate editor from 1899 to 1912. As showing his wide outdoor knowledge and interest, he was Leader in Zoology from 1901 to 1914. In 1927, he resumed activity in the Club as a member of Council. In its publication, the Ottawa Naturalist, twenty-nine articles by him appeared from 1895 to 1916, the first on "Colourless blood in animals" and the last on "Sea Squirts".

Professor Prince was in much demand as a lecturer from one coast of Canada to the other. He delivered the Popular Lecture at the Ottawa meeting of the Royal Society in 1895. He was also chosen to give the Sir John Murray Memorial Lecture on marine scientific research to the Society at its meeting in May, 1919.

In marked contrast to his colleagues on the Biological Board, Dr. Macallum and Dr. Knight, he avoided controversy, and preferred to conduct business through social amenities rather than by pressing issues. He was a most delightful companion, as I found on many an occasion, whether on a lengthy trip, as when he introduced me to a meeting of the American Fisheries Society at Boston in 1913, or at the Atlantic Biological Station at the close of a summer season. To a wonderful degree, he retained his boyish ardour. In returning in 1915 from his antipodean trip to study and report on the New Zealand fisheries for its government, he brought back on the long voyage to Canada living specimens of the interesting forerunner of the insects, *Peripatus*, to show to his associates, although unfortunately none survived till he could show them to the naturalists at Ottawa.

At St. Andrews in the Twenties he discovered that salamanders (*Spelerpes*) were living in a brook near the Biological Station and from him the latter became Spelerpes brook to my children from that day forth.

He liked to joke. In the Station museum, was part of a skeleton, picked up on the sea beach, on which his opinion was asked. He tried to make it the cranium of a cetacean, and we had to explain that it was the pelvis of a cow. He had his revenge by presenting to the museum a specimen of a new fish nicely preserved in a tall glass jar, suspended by the head from the eyelet of the lid, and labelled *Cornu bovis*. How many visitors to the museum were impressed by this wonderful creature from the ocean depths as it seemed to be, I do not know, but close inspection, even without knowledge of what the Latin name really means, revealed that it was a cow's horn, with paper "fins", with discs of felt for eyes, and with whelk's eggs for teeth!

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# MAMMALS OF THE MACKENZIE DELTA[1]

*By* A. E. PORSILD
*National Museum of Canada, Ottawa*

THE FOLLOWING LIST is based largely on field notes made during my residence in the Mackenzie delta, from April, 1927 to February, 1928 and from October, 1931 to October, 1935. During the first period I was stationed at Aklavik but actually spent very little time in the delta proper. The winter of 1931-32 was spent near Kittigazuit, at the mouth of the East branch, and on the Arctic coast. During the remaining three years my headquarters were at the Reindeer Station on the East branch, about twenty miles south of the limit of trees.

During these years I travelled extensively, in summer by canoe or by boat and in winter by dogteam. In 1927-28 I was engaged in a botanical survey; from 1931 to 1935 my work was chiefly administrative although intensive botanical field work was carried out whenever opportunity presented itself. Notes and observations on bird and mammal life were made, throughout my sojourn in the Mackenzie delta region, but were always incidental to other work.

Except for a few excursions into the foothills of the Richardson mountains to the west of the delta my personal observations are all restricted to the alluvial lowlands of the Mackenzie delta, the Arctic coast and the Eskimo Lake basin.

A list of the birds of the Mackenzie delta was published in this journal (Porsild, 1943). As was the case with the bird list I have obtained much important information from native and white trappers of the district. I am particularly indebted to Mr. K. H. Lang, who for many years has been a resident trapper and trader in the delta, for much valuable information on bird and mammal life. Mr. Lang also has contributed numerous specimens of birds and mammals to the collections in the National Museum of Canada, Ottawa.

In my list all mammals known to occur in the area have been enumerated, although a few of the small rodents were not actually seen by me.

I am indebted to Dr. R. M. Anderson and to Dr. A. L. Rand, both of the National Museum of Canada, for checking and verifying field determinations and for references to literature. Dr. Rand also has read the manuscript and has offered much valuable advice and criticism. I am further indebted to Mr. R. A. Gibson, Director of Lands, Parks and Forests, Department of Mines and Resources, for unpublished data on vital statistics and on fur exports.

A list of Eskimo names of the mammals of the Mackenzie delta was compiled in the field. This list was supplemented later by names obtained for me by Dr. L. D. Livingstone, Medical Officer of Aklavik, from the Eskimo Chikchigaluk of Kittigazuit. Dr. Diamond Jenness of the National Museum of Canada has kindly revised the orthography to make it conform to that of his Comparative Vocabulary (Jenness, 1928).

The most important publications on the mammals of the general region are by MacFarlane (1905), Preble (1908) and R. M. Anderson (1913 and 1937).

The earliest description of the Mackenzie delta was given by Franklin (1828) and Richardson (1851) who briefly described the East branch and the estuarial waters as well as the Arctic coast east and west of the delta. Some notes on the lower Peel are given by McConnell (1891) and by Preble (1908). Some recent notes on the delta are given by Porsild (1929, 1935 and 1943). Descriptive notes on the Eskimo basin are given by Harrison (1908), Anderson (1913), Stefansson (1913) and by Porsild (1929 and 1938).

---

[1] —Received for publication May 30, 1944.

### THE MACKENZIE DELTA REGION

The delta of the Mackenzie river occupies an isosceles triangle which includes not only the delta of the present day, but also the basin of the Eskimo Lakes through which, at one time, when the sea stood higher, at least part of the waters of the Mackenzie flowed.

From Point Separation, in latitude 67°35′, at the head of the delta to the Arctic coast the delta is approximately one hundred miles deep while its waterfront along the Arctic ocean is nearly two hundred miles long. The area comprises approximately 10,000 square miles. The area considered in my mammal notes further includes the Arctic coast of Yukon Territory from the delta to Herschel island.

While entirely within the Arctic circle, the southern and forested portion of the delta faunistically and floristically belongs to the Hudsonian zone, while the northern and treeless part, as well as the Eskimo lake basin and the foothills and mountains west of the delta, fall within the Arctic zone.

Towards the west the delta is bordered by the eastern slope of Richardson mountains, which rise to elevations well over 5,000 feet. Due to the proximity of this mountain range the precipitation in the foothills and in the western half of the delta is much greater than in the eastern part where the rainfall during the summer is but a few inches.

Towards the east, separating the delta from the Eskimo Lake basin, the Caribou hills rise slightly over 500 feet.

A short distance below Point Separation the Mackenzie delta spreads out into a great fan-shaped maze of rivers and channels. A great profusion of small rivers and streams, some navigable and some mere sloughs, interconnect the three main branches of the delta. Extensive lakes and swamps occupy the space between the river channels, almost to the exclusion of dry land. The course of most of the main river channels is changing rapidly due to river erosion and in some places the river cuts into delta islands at the rate of 50 feet or more in a season. Sedimentation, likewise, is rapid in the lower parts of the delta.

The upper portion of the delta, to within approximately 40 miles of the Arctic ocean, is well wooded with white spruce, black spruce balsam poplar, paper birch and tamarack. The white spruce is by far the most important tree, and near the head of the delta, attains a diameter of 18 inches.

When travelling through the Mackenzie delta by boat the waterways appear as narrow lanes through a great coniferous forest; but viewed from an aeroplane it is at once realized that the forest is narrowly limited to the higher river banks, and that a short distance back of the river banks, the ground becomes low and marshy, with numerous large and small lakes, the remnants of former river channels. The lower country is everywhere covered by almost impenetrable thickets of willow and alder.

In the delta the rivers are generally clear of ice by the first of June, but already in early April, the swelling of the Mackenzie a thousand miles to the south is felt. In May, the pressure of the water breaks the ice along the banks and water commences to flow into the lakes and swamps bordering the river banks. Spring then progresses rapidly. May is generally a month of clear skies and sunshine, and the snow on the land disappears surprisingly fast. By the end of the month a number of early flowers are in blossom. By June 1, all the rivers are generally free of ice while in the larger lakes some ice may remain until the end of June.

By the time the river ice has disappeared, practically all land in the delta, with the exception of the higher river banks, is completely inundated. In a few days the water commences to drop, and during early June gradually recedes from the swamps and meadows.

The climate of the Mackenzie delta is continental, with low winter temperatures only slightly tempered by the proximity of the ocean. The summers are short, but surprisingly warm in the delta proper and in the Eskimo Lake basin. In the delta the summer temperature is greatly influenced by the great mass of warm water carried by the river from the south. By the end of August the summer is over and sharp frosts frequently occur at night. The river generally freezes during the first week of November.

### MAMMAL HABITATS

A number of mammal habitats may be recognized in the area. The more important of these are as follows: white spruce forest, muskeg- or black spruce forest, willow- and alder thickets, lowland meadows, sub-alpine meadows, alpine- or upland tundra, lowland tundra, littoral, lakes and river channels, and estuarial waters.

White spruce forest occupies all higher ground in the upper part of the Mackenzie delta as well as in the foothills west of the delta. In the latitude of Aklavik the forest reaches an elevation of 1,800 feet; towards the coast the tree-line rapidly descends until the northern limit of trees is reached. Some white spruce forest is found in favoured and sheltered localities in the Eskimo Lake basin. Balsam poplar is not uncommon in the delta where it precedes the spruce on well drained alluvial soils. Black spruce and tamarack are rather uncommon in the delta, and the paper birch is rare, but is common in muskeg forest east and west of the delta.

Muskeg forest is not extensive in the delta it is found chiefly in low places in the foothills to the west and in the country which lies east of Point Separation and south of the Eskimo Lake basin. The dominant tree here is the black spruce. As regards birds and mammals the muskeg forest is a veritable desert, but is the home of incredible numbers of mosquitoes and black flies.

Willow- and alder thickets predominate in the lower parts of the delta, almost to the Arctic coast. Most of the country thus covered is inundated during the spring floods.

Lowland meadows occupy the still lower alluvial flats in the delta that are as yet too low to support a growth of willow.

Rather luxuriant sub-alpine meadows are found on the east slopes of the Richardson mountains, nearly always below extensive snow patches that are formed during winter and last until late in July. Sub-alpine meadows usually are found at elevations between 1500 and 2500 feet.

Alpine- or upland tundra, in the latitude of Aklavik, is found in the Richardson mountains above the 1500 foot elevation, and, towards the coast west of the delta, at sea level. East of the delta upland tundra predominates in the Caribou hills and in the higher parts of Richards island north of the delta.

Lowland tundra or marsh covers the low, alluvial plain separating the Eskimo lakes from the Arctic ocean. Although but sparsely covered by snow during winter this plain, during spring, is very wet. More than half of the surface is occupied by shallow lakes and ponds.

The transition from the littoral zone along the seacoast to the low, marshy tundra east of the delta is almost imperceptible. The seacoast here is sandy and low, abutted by sand dunes that gradually slope inland. West of the delta the sea-shore is gravelly, and is abutted by steep, slumping cut-banks. Above these the rolling coastal plain gradually merges into the foothills.

Lakes and river channels probably occupy more than two-thirds of the Mackenzie delta and more than half of the surface on the low, marshy plain which separates the Eskimo lakes from the sea. Most of the lakes in the delta support an astonishingly rich plant- and animal life. During summer the water temperature, even in the larger lakes, may reach 68° F. The waters of the small and shallow lakes east of the delta are somewhat cooler but warm up quickly and also abound in plant- and animal life. The temperature of the Mackenzie waters, a few days after the ice is out, reaches 60°, and, throughout June, July and August, remains above that level Water temperatures reaching 69° were observed on the lower East branch, on July 17th, 1927.

To the estuarial waters of the region should be counted the mouths of the main river channels, the very shallow sea adjacent to the delta, the shore waters east of the delta and Liverpool bay and the brackish Eskimo lakes. During the early part of the summer the shore waters remain fresh or but slightly brackish. The amplitude of the tide is small everywhere in the region, the largest spring tide measured being about three feet. In the Mackenzie delta the tide may be felt to about twenty miles above the mouth, and in the Eskimo lakes to the very head.

On July 21, 1927, the brackish sea water one mile off the northeast shore of Richards island measured 58° F. One-half mile off Atkinson point on the Arctic coast, on July 30, 1927, the water was 51° F., although the pack ice was but a few miles off the shore. At Cape Dalhousie, on August 5, 1927, the temperature of the sea was 45° F.

A series of surface temperatures, taken from a boat, in 1927, from Liverpool bay through the Eskimo lakes to Setidgi lake, are as follows:

| | |
|---|---|
| August 15. Liverpool bay | 45° F. |
| August 17-18. Entrance to Eskimo lakes | 54° F. |
| August 21. Head of last lake | 53° F. |
| August 23. Setidgi lake | 59° F. |
| August 23. Small river flowing into Setidgi lake (rainy day) | 54° F. |
| August 29. Entrance to Eskimo lakes | 48° F. |

### ESTIMATE OF PRODUCTIVITY

The Mackenzie delta region undoubtedly is the most productive wild life area in the Northwest Territories. The average annual harvest of muskrats alone is about 200,000.

The exact value of the total fur take in the delta area cannot be calculated at present, because returns do not always specify exact origin. Thus, the bulk of the white fox exported from Aklavik actually comes from Banks island or from the Arctic coast east of the area. Likewise, all beaver and most of the marten traded in 1943-44 were trapped outside the area. Nevertheless, it can be safely assumed that, in good years, the total value of the fur actually taken within the area exceeds half a million dollars.

Principal furs exported from the Mackenzie delta area in 1943-44[2] according to export permits issued at Aklavik, Tuktuayaktok, McPherson and Arctic Red river are:

| FUR | Number of pelts | Estimated average price in dollars | Estimated total value in dollars |
|---|---|---|---|
| muskrat ...... | 178,719 | 2.00 | 357,438 |
| coloured fox .... | 2,461 | 20.00 | 49,220 |
| white fox ...... | 3,000 (estimated)* | 35.00 | 105,000 |
| mink ............ | 558 | 20.00 | 11,160 |
| lynx ............ | 57 | 50.00 | 2,850 |
| | | Total .......... | $525,668 |

As a breeding ground for water fowl the Mackenzie delta probably ranks second in the Mackenzie drainage basin, only to the delta of the Peace river.

The rivers of the delta, the estuarial waters and the sea adjacent to the delta abound with excellent fish that each year provide an unfailing supply for men and dogs.

In 1935, domesticated reindeer were introduced to the area east of the delta (Porsild 1936). The industry has since thrived, and even now is an important source of fresh meat and skins.

According to the 1941 census the total White, Indian and Eskimo population was 1532. Of these, 210 were Whites, 639 Indians and 683 Eskimo. From other available sources it is estimated that 75 Whites, 150 Indians and 175 Eskimo were males of trapping age. Of this estimated total of 400 trappers, probably 100 trapped only part time in the delta area or were not full time trappers. With a total area of 10,000 square miles, each full time trapper thus has 33 square miles of trapping grounds. With a total annual production valued at $500,000 worth of fur the yield per square mile is $50.00 which undoubtedly is the highest yield per square mile in Canada. Each full time trapper, in good years, thus would average a trapping income of $1,750.00 alone from fur taken in the delta area. Actually the figure is much higher, since many delta Eskimo trap white foxes in Banks island and elsewhere. The per capita income of 1400 whites and natives including dependents, who depend on trapping is well over $350.00.

### LIST OF MAMMALS

**Sorex cinereus subsp.?**;
CINEREUS SHREW;
Eskimo: *Ugyungnaq*

Shrews were common at Aklavik during the winter of 1927-28. One specimen of this species was taken in my house at Aklavik, Nov. 2, 1927.

In 1931-35, shrews were often bothersome at the Reindeer camps on the East branch, particularly in cellars or in meat caches. Large numbers were killed in a cellar on the East branch Reindeer Station during the winter of 1933-34.

Mr. Lang informs me that shrews fluctuate considerably in numbers and, that when plentiful, are bothersome because they eat up fish bait in traps set for fur-bearers.

**Sorex tundrensis Merriam**;
TUNDRA SADDLE-BACKED SHREW

Jackson (1928, Rev. Amer. Long-tailed

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2. —The period actually covered is from June, 1942, to February, 1944, but in effect, constitutes a complete year of exports.

3. (*)—The estimated number of white fox in the above table is but a very small fraction of the number of pelts actually exported. The figure given was reached after careful consideration, and is based upon personal knowledge of local conditions and and circumstances.

Shrews, p. 72) refers one specimen taken by R. M. Anderson, south of Toker Pt. (at Tuktuayaktoq), Sept. 30, 1909, to *Sorex tundrensis.*

**Ursus americanus americanus** Pallas;
BLACK BEAR

The black bear is not common in the Mackenzie delta where it is rarely seen below the latitude of Aklavik; a few are taken each year. In the autumn its favourite haunt is the mouths of small streams where it feeds on fish fry. In the delta it hibernates from late October to the middle of April (Lang).

**Ursus spp.**;
BROWN AND GRIZZLY BEARS;
Eskimo: *Aklak*

Brown or grizzly bears were common in the Mackenzie delta region during my residence, particularly in the mountains west of the delta and in the Eskimo Lake basin. Anderson (1937) considered that at least five species might be recognized in the area, but admitted that their delimitation had not then been worked out satisfactorily. (See note p. 8).

Some bears, which inhabit the mountains west of the delta, are definitely larger than those of the barren grounds to the east. In addition, Mr. Lang informs me, there is a rather small and very different kind of bear in the mountains. In 1933, I saw the skin of one of these bears which had been shot by Mr. Lang, in July, 1928. It may be distinguished from all other bears of the region by its light, cream-coloured back, and brown belly. The skull is in the National Museum of Canada.

Mr. Lang reports that in spring bears from the mountains come into the delta where he has often seen them on large lakes investigating rat houses or digging for insects, freshwater snails or dead fish.

Since 1935, a number of bears have been attracted by the reindeer herds. While few have actually molested the reindeer, a number have been shot when disturbing reindeer herds on the range. In Alaska brown bears have been known to kill reindeer regularly.

In the region the brown bears normally hibernate from October to May, but occasionally, during mild weather, may be "out" as late as November and as early as April.

Brown or grizzly bears are not hunted regularly, but are shot by native or white hunters whenever encountered. When in good condition, the flesh is highly prized for food. The pelts are generally sold to tourists rather than traded.

The food of the species consists of the fleshy roots of plants, grass and other herbage, fish, and ground squirrels. After emergence in spring, bears frequent river banks where they dig for the fleshy roots of liquorice root (*Hedysarum boreale*) which is very common in such places. In August and September bears may be found on hillsides where blueberries and cloudberries are plentiful or they visit colonies of ground squirrels that are then fat. The writer has often seen places where a bear has systematically uprooted an entire colony of squirrels.

Dr. R. M. Anderson of the National Museum has contributed the following notes on the five kinds of grizzly bears now definitely recognized as occurring in the area covered by this paper and represented by authentic specimens in the National Museum; they are:

*Ursus richardsoni Swainson.* BARREN GROUND BEAR.

*Ursus internationalis internationalis* Merriam. ALASKA BOUNDARY GRIZZLY.

*Ursus internationalis russelli* Merriam. MACKENZIE DELTA GRIZZLY.

*Ursus macfarlani* Merriam. MACFARLANE GRIZZLY.

*Ursus andersoni* Merriam. ANDERSON GRIZZLY.

For more than one hundred years the grizzly bears of the Canadian Arctic have been popularly "lumped" as the Barren Ground Bear or Richardson Barren Ground Grizzly, *Ursus richardsoni* Swainson (1838), type from shore of the Arctic ocean, on west side of Bathurst inlet near mouth of Hood river, collected by the Franklin expedition on August 1st, 1821. The National Museum of Canada has a fine large male topotype (skin and skull) collected in summer of 1915, and a number of other specimens have been brought out from districts farther west. No specimens definitely referable to *richardsoni* had been obtained from the Mackenzie Delta region until A. E. Porsild brought out a large male skull (N.M.C., No. 17580), one of two bears shot on same date at western edge of Caribou hills near the Reindeer Station in 1932.

In 1914, Dr. C. Hart Merriam (*Proc. Biol. Soc. Washington, 27*: 177-178) described two new species from the region on west side of the Mackenzie delta, referring them later to his *richardsoni* group (1918, Review Grizzly and Big Brown Bears North Amer., *N. A. Fauna* No. 41):

*Ursus internationalis* Merriam, type (N.M.C. No. 1763) from Alaska-Yukon boundary, about 50 miles south of Arctic coast (lat. 69° 00′ N., long. 141° W.), collected July 3, 1912, by H. F. Lambart of Ottawa (Merriam, 1914 *ibid.*, pp. 177-178).

*Ursus russelli* Merriam (1914, *ibid.*, p. 178), type (Mus. Nat. Hist., Iowa, No. 21301), adult male, West branch of Mackenzie delta, near Black mountain, collected June 28, 1894, by Frank Russell. Cast of type skull in N.M.C., No. 16134.

These two forms were described from single specimens, and for many years no additional specimens were brought out, although grizzlies were occasionally killed in the region. On October 9, 1931, Mr. Porsild obtained a nearly topotypical skull from foothills west of the delta (N.M.C. No. 11575), fairly typical of *russelli*. In October, 1941, J. A. Parsons, foreman of the Reindeer Station, obtained skin and skull of an adult male (N.M.C., No. 17194) on Richards island, Mackenzie delta, with some of the characters of *russelli*, but on the whole closer to *internationalis*. Another specimen (Carnegie Museum, No. 21627), not adult, taken by A. C. Twomey, November 15th, 1942, at Red mountain, Richardson mts., west of the delta, has been examined by the writer and referred to *internationalis*, although it shows some characters resembling the type of *russelli*. From the evidences of intergradation shown in skull and teeth of the above specimens it seems justifiable to consider *russelli* as a subspecies of *internationalis*, the latter name having priority of one page in the original description of the two forms.

Of the *planiceps*-type of grizzlies, *Ursus macfarlani* Merriam (1918, p. 51), type from Anderson river, 50 miles below old Fort Anderson, Mackenzie district, collected by Roderick MacFarlane, May 8th, 1863, had its range first definitely known to extend to the northeastern part of the Mackenzie delta region, from three specimens obtained by Mr. Porsild, the first (N.M.C., No. 9501), Third Eskimo lake, summer of 1927 (skull only); the second (N.M.C., No. 11676) from Kittigazuit, east side of Mackenzie delta, April, 1932 (skin and skull); the third (N.M.C. No. 12269) from east branch Mackenzie delta near Kittigazuit, September, 1932. One juvenile skin and skull (N.M.C., No. 16892) was obtained from Eskimos by Dr. Seymour Hadwen at reindeer camp on Richards island, in summer of 1939; and two additional specimens (Carnegie Museum, No.'s 21624-5) female with cub, taken by A. C. Twomey on Loon Channel on west side of Richards island, June 15, 1942. The MacFarlane Grizzly is a comparatively small grizzly with much shorter snout, and with front claws shorter, less curved, and darker than in the much larger *richardsoni* which inhabits much of the same territory.

In the *hylodromus*-group (Merriam, 1918, p. 83), which includes the Kluane Grizzly (*Ursus kluane klaune* Merriam, 1916) and Pelly Grizzly (*Ursus pellyensis* Merriam, 1918), Merriam tentatively includes the Anderson grizzly (*Ursus andersoni* Merriam, 1918, pp. 83-84), type from East branch of Dease river, near Great Bear lake, Mackenzie district. For many years this species was known only by the type (No. 34402) in American Museum of Natural History, New York. A cast of the type skull (N.M.C., No. 17095), and some skins tentatively referred to *andersoni*, have been examined. This species has been added to the Mackenzie delta area by a skin and skull of an adult male (N.M.C., No., 11574) obtained by Mr. Porsild at Ikimilik, Eskimo lakes, east of the Mackenzie delta, June 25, 1932. The National Museum has one additional skull (No. 11041) obtained by C. B. Dawson northeast of Great Slave lake in summer of 1929, and a skin and skull of adult male taken by George Magrum at Aylmer lake, northeast of Great Slave lake, August 9, 1935 (N.M.C., No. 16891). The writer has examined another skull referable to this species (R.O.M. Zool., No. 16012), shot by Baker lake Eskimos, probably in Keewatin district, N.W.T., and originating presumably in the area including Back, Dubawnt, Kazan and Thelon rivers.

Among probabilities to be looked for in the Mackenzie delta region, although no actual specimens have been taken and preserved, is a well-marked species of the *stikeenensis*-group, the Thickset Grizzly, *Ursus crassus* Merriam (1919, pp. 90-92), type from upper Macmillan river, Yukon Territory, and also recorded by Merriam from Anderson river; represented in National Museum of Canada by casts of two skulls from lower Horton river south of Franklin bay (originals in Amer. Mus. Nat. Hist.), and one large skin and skull (N.M.C., No. 3983) taken by Eskimos in vicinity of lower Coppermine river near Coronation gulf, and obtained from Joseph F. Bernard. *Ursus crassus* differs from *U. richardsoni* found in the eastern part of its range in having long narrow skull and very large teeth, the last upper molar being exceptionally long.

Another species, representing the "Tundra Bears" of the *Ursus kidderi*-group, may occur along the narrow coastal area west of the Mackenzie delta. The National Museum of Canada has skin and skull of an adult male (No. 3503) taken in October, 1917, on the northern slope of British mountains between Barter island, and Demarcation point. It is a large bear with narrow skull and very short stubby front claws.

Very little mammal collecting has been done in the Richardson mountains on the west side of the Mackenzie delta, beyond their eastern foothills, but two or more forms of grizzly bears, known to occur in these mountains, have not been determined for lack of adequate material. Specimens of adult bears can usually be scientifically determined from adult skulls (which unfortunately are usually thrown away by the hunter), but descriptions of external characters, measurements, colour of coat, length and shape of claws, which are of more use to sportsmen, hunters and trappers can not be made until more skins are available in museum collections where they can be kept for reference and studied and compared with other specimens. The valuable collections made by Mr. Porsild as a side line to his other scientific and administrative work in Arctic Canada are a worthy example of what can be done. — R. M. ANDERSON.

**Thalarctos maritimus** (Phipps);
POLAR BEAR:
Eskimo: *Nanoq.*

The polar bear is probably always a rare visitor to the Mackenzie delta region and is hunted by the Eskimo only during winter, when bears occasionally visit the Arctic coast. A few polar bears were shot near Herschel island in 1927-28, and a few have been killed east of the delta during my residence.

Mr. Lang reports that a polar bear was killed at Kigdluait on the north end of Richards island, in August, 1936, when it came into a reindeer herd during a round-up. In spring polar bears frequently eat vegetable food; the content of a number of stomachs examined consisted largely of grass and small willow twigs.

**Martes americana actuosa** Osgood;
ALASKA MARTEN;
Eskimo: *Qaveasaq* (meaning a small wolverine).

Marten were rather scarce in the area in 1927-28 and 1931-35. A few are taken each year in the higher portions of the delta. Mr. Lang informs me that during his residence in the delta he has never taken any marten on his trap lines although he has seen occasional tracks. He thinks that marten are killed off by trapping as fast as they come into the delta, and that one or two is the largest number taken by any one trapper in the delta. Marten are more plentiful on the Peel river and east and south of the delta where annual catches may be as high as 20 to 30 per trapper.

**Mustela arctica arctica** (Merriam);
ARCTIC WEASEL;
Eskimo: *Tiriaq* or *Tigiaq.*

Weasels were common in the area in 1927-28 and again in 1931-35, but the species is not considered important as a fur-bearer and most of the animals taken by trappers probably were accidentally killed in traps set for mink.

Mr. Lang informs me that weasels fluctuate considerably from year to year and that they increase in numbers when "mice" are plentiful. Mr. Lang's largest annual catch is 130, and his smallest 25.

When not molested, weasels become very bold and often live under the floor of cabins or in wood piles. Many white trappers like to have a weasel family around their camps to keep down the "mice". Arctic weasels regularly occupied a wood pile at the Reindeer Station during winter, feeding on frozen fish stored for dog feed. On May 15, 1935, the weasels had turned completely brown.

**Mustela rixosa** (Bangs);
LEAST WEASEL;

This species (probably the Alaska least weasel) is much less common in the area than is the Arctic weasel, but a few are taken each year. In 1933, I saw a skin said to have been taken on the Peel river. Mr. Lang tells me that the Indians call it the "lucky or luck-bringing weasel" probably because its presence is thought to coincide with abundance of "mice" which, again, means abundance of other fur bearers. Mr. Lang has presented several skins to the National Museum of Canada.

The species does not appear to have been recorded previously from the region.

**Mustela vison ingens** (Osgood);
MINK;
Eskimo: *Tiriaqpak* (large weasel).

The mink was common, in 1927-28 and 1931-35, in the wooded parts of the area, where it preferred small rivers and creeks. North of the tree-line it was always less common although a number of animals were taken each year, at least as far north as the south end of Richards island.

Mr. Lang tells me that in the Mackenzie delta the mink feeds chiefly on fish and muskrats. It can follow the latter under the ice of a lake to the rat house or push-up where mink are occasionally caught in traps set for rats. Mink are often seen in the autumn on small rivers and creeks. In mid-winter the water level in such creeks drops, leaving a dry shelf under the ice along creek- and lake banks. In cold weather the mink stay in such places but often come out during snow-storms when they frequently travel long distances. In the Mackenzie delta individual catches may reach 75 to 85 mink in a season. In 1943-44 the total export from the delta was 558 pelts.

**Gulo luscus luscus** Linnaeus;
WOLVERINE:
Eskimo: *Qavvik* or *Qavviaq*.

During my residence in the Mackenzie delta, wolverines were rather scarce and probably less than a dozen were taken annually by all trappers in the region. As elsewhere in the North, the wolverine does considerable damage by destroying fur caught in traps and by breaking into caches and uninhabited cabins. MacFarlane (1905) correctly epitomizes the sentiment of most northerners when he remarks that "it is undoubtedly entitled to first place among the destructive animals of North America, and also the most detested of them all."

Mr. Lang tells me that wolverines are solitary animals; while their numbers vary, they are never plentiful. They appear to migrate to the delta region from the mountains and from the barren grounds to the east. When a wolverine comes upon a trap-line it often "stays" on the line all winter following closely behind the trapper eating up bait and fur-bearers caught in the traps; or it may pull down pens built for marten or mink sets, or even destroy tents. Wolverines are very hard to catch, and when caught will often manage to get out of traps. One old wolverine preyed on Mr. Langs' traplines for two and one-half years and destroyed several hundred dollars worth of fur before he succeeded in catching it.

The fur of the wolverine is highly prized by the Eskimo for trimming fur parkas, and for this reason no wolverine fur is ever traded. On the contrary, skins are brought into the North from elsewhere and sold to the Eskimo, who sometimes will pay as high as $100.00 for a prime, long-haired and pale wolverine pelt.

**Lutra canadensis preblei** Goldman;
OTTER;
Eskimo: *Pamioqtooq*.

The otter is a rare visitor to the Mackenzie delta. The highest number taken in the delta in any one season by all trappers is two or three, and in some years none are taken (Lang).

**Vulpes fulva alascensis** Merriam;
RED FOX; Eskimo: *Kayoqtoq* or *Aukpilaqtoq* (meaning yellow or red respectively); CROSS FOX; *Qiaserotilik*; BLACK OR SILVER FOX; Eskimo: *Qernerartoq* (meaning black) or *Magoq*.

The coloured fox is very common in the Mackenzie delta where as a fur bearer, it is second in importance only to the muskrat. Its numbers fluctuate a good deal, but less so than those of the white fox. Mr. Lang states that coloured foxes migrate from the mountains and from the barrens to the delta when rabbits or mice are plentiful here, and that it often breeds in the delta. The coloured fox is more cunning than is the white, and old foxes are hard to trap. Fifty coloured foxes is considered a good catch in the delta but catches of 100 are not unusual.

The total 1943-44 export from the delta was 2,461 pelts.

**Alopex lagopus innuitus** Merriam;
ARCTIC WHITE FOX;
Eskimo: *Terigannngniaq.*

The white fox was plentiful along the Arctic coast of the district in 1927-28, although much less so than farther to the east and on the Arctic islands. Individual catches of 50 were considered good in the Mackenzie area whereas catches of over 200 were not uncommon east of Cape Bathurst. The largest catch in 1927-28 was made on Banks Island where one family of five trappers secured 1,200 pelts.

In the district the white fox is rarely found very far from the sea coast; thus, in the Eskimo Lake basin, most of the foxes taken are coloured.

The Eskimo consider the white fox one of the easiest to trap of all furbearers, and all the skill required from the trapper is to set his trap in such a way that drifting snow will not cover the trap or render its mechanism inactive. To this end, steel traps are usually placed in a hole carved into hard snow. The opening over the trap is covered in a variety of ways by the use of a thin shell of snow, tissue paper or the down of snowy owls, swan or ptarmigan. Putrid ground squirrel is a favourite bait for white fox, but rotten fish or seal is used as well. While steel traps are universally used, a few of the older Eskimo still prefer the more laborious but more effective dead-fall. A driftwood log is usually used for this purpose.

The blue or grey phase was rare and but few were seen in the course of my residence in the delta. Those seen were all of a dirty grey, much paler and much less beautiful than the Greenland blue fox.

Since 1935, large numbers of white foxes have been attracted to the Mackenzie delta region by the herds of domesticated reindeer. In May, 1935, during the fawning season, white foxes were frequently seen in the reindeer herd, and would occasionally attack weak fawns. A number of white foxes are shot each winter by herders following the reindeer herds.

**Canis latrans** Say;
COYOTE;
Eskimo: *Amarognag.*

At least for some years preceding 1927, coyotes had been invading the Mackenzie delta, apparently from the west, and a number of pelts were traded each year at McPherson and at Aklavik, as well as at trading posts up the river. During the winter of 1927-28, coyotes were very common between Arctic Red river and Norman and did considerable damage to fur caught in traps. Above Sans Sault rapid the writer saw the pelts of 12 coyotes taken by one trapper.

In December, 1927, on the Arctic coast just east of the delta, the writer saw a coyote which had been taken in a trap. The coyote was then unknown to the Eskimo of the region, who thought this particular animal a "cross between a dog and a red fox". The skin and skull are in the National Museum of Canada.

As far as the writer was able to learn, no coyotes were taken in the delta during the years 1931-35.

Mr. Lang informs me that in late years coyotes have been rather infrequent visitors to the Mackenzie delta.

**Canis lupus**[4] Linnaeus;
ARCTIC WOLF;
Eskimo: *Amaroq.*

In 1927 and 1928, arctic wolves were scarce in the Mackenzie Delta region, but rather common in the country north and northeast of Great Bear lake. When travelling there by dog-team one or two wolves were always following in the trail. When camp was made the wolves would circle the camp always keeping well outside rifle range. Once, when travelling on foot near Dismal lakes, I was followed by three wolves all day; the wolves keeping at all times at a distance of a mile or more. Only once during the winter did a wolf come within shooting range and this during a blizzard when a large, male wolf almost walked into my camp before seeing the tent and dogs.

In the years 1933 to 1935 when a drove of

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4.—The wolves of the Canadian Arctic coastal region have long been conventionally referred to **Canis lupus tundrarum** Miller 1912, type from Point Barrow, Alaska. The wolves of northern Mackenzie district have recently been described as **Canis lupus mackenzii** Anderson (1943), ranging from Great Bear Lake east at least to Bathurst Inlet and west to east side of Mackenzie delta. The wolves coming in from the westward of the delta are presumably **tundrarum**, but no skulls of Arctic wolves from the Mackenzie delta and arctic Yukon are known to be in any collection, and the northern wolves are so variable in colour that it is impossible to determine them subspecifically by the skins alone. As with the grizzly and black bears, seals, marmots, porcupines, and some other arctic and subarctic mammals, scientific specimens are greatly needed by Canadian museums. — R. M. Anderson.

domesticated reindeer was moving along the north coast of Alaska to the east side of the Mackenzie delta, numerous wolves followed the herd. During severe blizzards, when the reindeer herders were unable to watch the herd, wolves frequently attacked. During the winter of 1933 at least 60 reindeer were killed by them.

A number of wolves followed the reindeer herd across the Mackenzie delta, but since the herd has become permanently established in the Reindeer Grazing reserve east of the delta, the constant vigilance of the herders has been sufficient to keep the wolves away. Some stray reindeer, however, are lost each year due to these predators.

Mr. Lang tells me that in the mountains and foothills west of the delta, wolves always follow in the wake of migrating caribou herds. When near the delta, wolves make occasional forays to the delta for rabbits.

**Lynx canadensis** Kerr;
LYNX;
Eskimo: *Pitaqsigog.*

Lynx are never very plentiful in the Mackenzie delta region. Mr. Lang informs me that his highest catch is 14 lynx, in one season, but that in some years he has caught none. He states that the lynx appears to be coming into the delta when rabbits are plentiful, and that they move away when the rabbits are scarce. Lynx were more plentiful in 1943 than they have been for some years.

The lynx is a very timid animal and is easily frightened by the noise of dog-teams. They travel together in small family groups and, when not disturbed, may remain all winter within an area of a few square miles of willow thicket. They are most inquisitive animals and are very easy to trap.

The total export from the delta, in 1943-44, was 57 pelts.

**Phoca vitulina richardii** (Gray);
PACIFIC HARBOUR SEAL;
Eskimo: *Qasigiaq.*

The Pacific harbour seal is probably common along the north coast of Alaska, at least as far east as Herschel island, where a number were seen, in March, 1927, in the ice cellar of an Eskimo. These were said to have been taken in nets with other seals before the freeze-up.

In Greenland the skin of the eastern harbour seal is highly prized as a fur. In the western Arctic the skins of the harbour seal are not in demand by the Eskimo. When seals are plentiful the skins are rarely removed and the whole seal is permitted to freeze before being chopped up for dog food.

**Phoca hispida beaufortiana** Anderson;
RINGED SEAL;
Eskimo: *Natsiq.*

This is the common seal of the Mackenzie district, but is not as common in the vicinity of the delta as is the bearded seal. It is of little importance to the delta natives who obtain their "seal oil" chiefly from the white whales. The skins are still in some demand for the tops of native skin boots.

A number of seals are shot each year by natives travelling along the coast in boats, but, since the animal sinks quickly in summer, few are secured in this way.

The original methods of catching seals by spearing or by netting under the ice are now practically unknown to the Eskimo of the Mackenzie delta. Some seals are taken each year in seal nets set in open water.

**Phoca groenlandica** Erxleben;
HARP SEAL.

A specimen of this species was taken in a fish net at Aklavik on the West branch of the Mackenzie delta in 1926. I did not see the specimen but I saw a photograph made by the Rev. Father (now Bishop) Trocellier O.M.I., showing an adult harp seal.

The harp seal, and the hooded seal, are Atlantic seals not previously recorded in, and quite unknown to the natives of, the western Arctic.

**Cystophora cristata** (Erxleben);
HOODED SEAL.

The reported killing, in the summer of 1931, of a "sea lion" at Herschel Island caused me to make extensive inquiries amongst the large number of natives and whites who had been present.

In this way a fully corroborated report and a detailed description was obtained, which conclusively proves the animal to have been the hooded seal, an Atlantic species never before recorded west of Hudson bay. The hooded seal was completely unknown to the Mackenzie Eskimo.

Dr. C. H. D. Clarke has informed me that a hooded seal was killed at Tuktuayaktoq, in 1941-42.

**Erignatus barbatus** (Erxleben);
BEARDED SEAL. Eskimo *Ugyuk.*

The bearded seal is fairly common along the seacoast and in the estuarial waters, and occasionally ascends the Mackenzie to the head of the delta. During the summer of 1932 bearded seals were observed a number of times on the East branch, near the Reindeer Station, where they sometimes would climb on to the river bank.

The bearded is the largest seal of the district and is highly prized by the Eskimo. The skin was formerly used for covering of skin boats and is still much in demand as soles for native boots. The skin also provides the best rawhide thongs, formerly used for dog harness and traces, harpoon lines, etc., but with the decline of the original Eskimo hunting technique rawhide rope is not now in great demand. The animal also yields a large amount of meat and blubber.

**Odobenus divergens** (Illiger);
PACIFIC WALRUS;
Eskimo: *Aiviq.*

The walrus is known by name only to the majority of the Mackenzie delta Eskimo, although stragglers are known to reach as far east as Baillie island. During the autumn and early winter of 1931-32 a few walrus were reported in the vicinity of Herschel island. The walrus is not hunted by the Eskimo and, as far as I was able to ascertain was never numerous near the delta.

**Marmota caligata caligata**[5] (Eschscholtz);
HOARY MARMOT;
Eskimo: *Sik-sikpak* (a large *sik-sik*).

Indian hunters in the Mackenzie delta assured me that the hoary marmot was found in the mountains west of the delta, and my brother, Mr. R. T. Porsild, on May 8, 1927 reported seeing hoary marmots on Black mountain southwest of Aklavik. No pelts or animals were ever brought in during my residence in the delta and the record of this species is perhaps in need of confirmation.

**Citellus parryii parryii** (Richardson);
PARRY GROUND SQUIRREL;
Eskimo; *sik-sik* (from the sound made).

Ground squirrels are very plentiful in the Caribou hills east of the Mackenzie delta and along the Arctic coast east to Liverpool bay where large colonies were noted. In a large dune near Cape Dalhousie a colony, which probably numbered several hundred animals, was observed in August, 1927. Other large colonies were seen along the escarpment of the Caribou hills east of the delta and on sandy ridges in the foothills of Richardson mountains, to an altitude of about 1500 feet. The ground squirrel is not often seen in the forested parts of the delta region, except occasionally where the soil is sandy.

On the East branch, in 1932, the first ground squirrel was seen on April 10. The last appearance was on December 8, 1931, when a single animal was seen in the same place during a period of mild weather.

A male taken (Dease valley east of Great Bear lake) on May 5, 1928 was very fat. Mating appeared to have started and it had a very strong odour. At Cape Dalhousie the young were almost full grown on August 10, 1927. Most animals examined were heavily parasitized by a species of tick.

Ground squirrels require a light sandy soil for their burrows and, where suitable conditions occur, large colonies are formed. Large stabilized dunes covered by lyme grass (*Elymus*) and other fibrous rooted plants may be honeycombed from end to end. The tunnels, as a rule, are from 6 to 12 inches below the surface. During the summer the food of the ground squirrel consists of the tender roots, stems and leaves of many kinds of plants. During autumn their favourite food is the bulbils of *Polygonum viviparum*, the unripe aschenes of mountain aven (*Dryas* spp.), unripe capsules of the arctic poppy (*Papaver* spp.), and the unripe seeds of several species of legumes, chiefly *Hedysarum* and *Astragalus*.

The economic importance of the species is not large. A number is taken in traps or in wire snares by the Eskimo for food. Putrefied carcasses are a favourite bait for white foxes. Excellent inside parkas are made from the furs of ground squirrels and are highly valued because of their lightness and durability. The fur appears to be prime during August.

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[5] —It is quite possible that the Hoary Marmot of this region is referable to **Marmota caligata broweri** Hall and Gilmore (**Can. Field-Nat.**, 1934:48(4) pp. 57-59 and Anderson, **ibid.**, pp. 60-63, with map),type from Point Lay, and one other specimen from Cape Thompson, northwestern Alaska. Marmots are known to occur on north slopes of Endicott Mountains (Brooks range) and the writer has seen parts of skins from Hulahula river, Alaska, in possession of natives who had taken them, but no scientific specimens have been brought out from that area.—R. M. Anderson.

Brown bears prey on ground squirrels when these are fat during September and October. Other enemies are white foxes and snowy owls.

**Tamiasciurus hudsonicus preblei** Howell;
MACKENZIE RED SQUIRREL;
Eskimo: *Napaqtam sik-sik* ("Squirrel of the trees").

Red squirrels are common in the forested parts of the Mackenzie delta region, and appear to be active throughout the winter, except perhaps in very cold weather. Mr. Lang states that the species fluctuates considerably from year to year. I have, myself, not noticed any very marked fluctuations.

A female taken on the East branch on May 17, 1935, contained four almost fully developed young.

Red squirrels are not trapped for their fur in the region and, perhaps for this reason, become very bold and at times even bothersome. At the Reindeer station on the East branch, squirrels could not be kept out of the log warehouses where their predilection for dried fruits, especially apples, and for shiny objects such as pearl buttons from woollen underwear, eventually led to an extermination campaign. Mr. Lang informs me that in late years, a few red squirrels are traded in the Mackenzie delta, chiefly by children, for candy.

In the Mackenzie delta the principal food of the red squirrel is the seeds of white spruce, but fleshy fungi also appear to be of importance. The fungi eaten by the squirrels are placed in trees to dry and undoubtedly are stored for use in winter.

**Castor canadensis canadensis** Kuhl;
BEAVER; Eskimo: *Kigiaq.*

The beaver formerly was common in a number of small rivers and streams draining into the Mackenzie delta and the Eskimo Lake basin. During the years of my residence in the district, a number of beaver were still taken each year on the upper Peel, while the species had almost disappeared from the country east of the delta proper, where a few colonies only remained near the head of a stream draining into Setidgi lake. Another colony survived on Nils Holm's creek, a small stream which drains the treeless country east of the Caribou hills.

Trappers in the Mackenzie delta inform me that some beaver come into the delta each year but, that in spite of the measure of protection which has been given in recent years, they are not yet showing any marked increase. There are many streams suitable for beaver and with continued protection the delta region should be able to support a fairly large population of beaver.

**Mus musculus** Linnaeus;
HOUSE MOUSE.

Two specimens were taken at a reindeer camp on the lower East branch in October, 1931. These were probably introduced during the preceding summer and the species was not observed again. The Eskimo did not know the house mouse.

**Peromyscus maniculatus borealis** Mearns;
WHITE-FOOTED MOUSE.

The only record from the area is from Herschel island where the species was accidentally introduced from a river transport barge (Anderson, 1937).

**Lemmus trimucronatus alascensis** Merriam;
ALASKA BROWN LEMMING; Eskimo: *Avingaq*

Lemmings, of this sub-species, are common in northern Alaska and northern Yukon and on the barren ground east of the Mackenzie delta as far as Cape Bathurst, but, except in years of unusual abundance, are so little in evidence that they are rarely observed.

On the east slope of the Caribou hills nests or runways were frequently observed in rather dry, sandy tundra.

In late summer the food of the lemming consists largely of the immature achenes of the mountain aven (*Dryas integrifolia*).

Specimens were obtained from Tuktuayaktoq and from Kittigazuit, and are recorded from Herschel island by Anderson (1913 and 1937).

While the Eskimo undoubtedly can distinguish lemmings, field mice and voles, the name *avingaq* is used rather indiscrimately as, indeed, "mice" is used by most white inhabitants of the north for the same animals.

**Discrostonyx groenlandicus rubricatus** (Richardson);
ALASKA COLLARED LEMMING;
Eskimo: *Avingaq.*

The collared lemming was very common on the Arctic coast west of the Mackenzie delta in the winter of 1927-28. In April, when the snow disappeared from the sea-ice during a chinook storm, numerous dead lemmings became exposed. Observations made in 1932-33 when the species was again plentiful, confirmed that the lemmings sometimes do wander off to the ice early in the winter. The curious belief of the Eskimo (Anderson, 1913) that lemmings "fall from the sky" perhaps was originated by the sudden appearance of thousands of dead lemmings on the sea-ice following a rapid thaw. However, several Eskimo assured me that the lemmings sometimes are blown from the land during severe gales. Chinook winds of high velocity are very common in the region and it is possible that, following a thaw, when the snow is icy, lemmings actually may be blown from the land.

In December, 1932, when travelling with dogs from the Reindeer Station to Shingle point, numerous live and dead lemmings were seen on the ice of the river channels and also on the sea-ice off the delta. The trip was made during a spell of exceptionally warm weather, when the thermometer for almost a week stood well above freezing. Nearly all the lemmings seen on the ice were wet and would undoubtedly freeze to death with the onset of cold weather. During the trip, two or three lemmings generally would be in sight from the sledge at all times.

Mr. Lang informs me that a few lemmings, probably of this species, may occasionally be seen in the timbered parts of the delta.

The species is probably as common east of the delta as is the Back Lemming. Two specimens were obtained from natives at Kittigazuit, in 1928.

The Hudson's Bay Company at one time experimented with the fur of the Collared Lemming. In 1931-32 I was shown a beautiful lady's coat made from its furs.

**Clethrionomys dawsoni dawsoni** (Merriam); Dawson Red-backed Mouse; Eskimo: *Avingaq*.

The red-backed mouse is probably the most common of the "mice" of the district, or at least the species that is most in evidence. Unlike the lemming, it is common in the forested part of the region, although it extends well into the untimbered country east of the delta. The species is attracted to human settlements and does considerable damage to sack goods in warehouses. During a three-week's absence red-backed mice had carried off half the contents of a 80 pound bag of rolled oats stored in the attic of my house at Aklavik. Part of the oats were later found "cached" in the pockets of a coat hanging in a downstairs bedroom.

In spring red-backed mice were frequently seen feeding on moist lichens (*Cladonia* and *Cetraria*) exposed under the snow. A female with five young, still suckling, was taken at the Reindeer Station, June 3, 1933.

**Microtus pennsylvanicus drumondii** (Audubon and Bachman);

Drummond Meadow Mouse.

The National Museum of Canada has four specimens taken by Mr. Lang about 26 miles south of Aklavik in October and November, 1937, and this vole has been recorded by Preble (1908) from various posts as far north as McPherson and from the Anderson river.

**Microtus operarius macfarlani** Merriam;

Tundra Mouse;

Eskimo: *Avingaq.*

The tundra vole is common in low, rather wet tundra or meadow, probably throughout the region.

In the autumn its caches of food may often be found in the runways near the ground under vegetation. One of the principal foods is the succulent roots of liquorice root (*Hedysarum boreale*). In Alaska, Eskimo sometimes obtain a winter's supply of this food by robbing the "mice" caches that are easily located under the snow by the use of a trained dog. (Porsild, 1937).

**Microtus xanthognathus** (Leach);

Chestnut-cheeked Vole.

MacFarlane (1905, p. 735) records numerous specimens from Fort Yukon (Alaska), McPherson and from Anderson river; and many specimens from the mouth of Porcupine river, taken by Robert Kennicott about 1859-1860 are in various museums in the United States. This large species appears to be very local and fluctuating in numbers, and intensive trapping in areas where it was formerly known to be abundant may not yield a single specimen (R. M. Anderson).

**Odondatra zibethica spatulata** (Osgood);
NORTHWEST MUSKRAT;
Eskimo: *Kivraluk.*

Muskrats are very common in the Mackenzie delta, particularly in the timbered parts where life conditions are very favourable to the species and where, therefore, the greatest density of rats is observed. The species extends some distance north of the timberline into the low and marshy parts of the delta, but their numbers diminish rapidly as one leaves the forested area. In the untimbered country, to the east of the delta, some rats are found in most of the large lakes and in the deep creeks and lakes that are tributary to the Eskimo lakes basin. Muskrats also occur, if in small numbers, in the Kugaluk and Anderson river areas. The northward and eastward range of the species is largely governed by the depth of lakes and the thickness of their ice-cover in winter. Rats, therefore, are not found in all lakes in the barren grounds, but only in those that are deep and enclosed by high banks. Due to the shelter afforded by the high banks such lakes generally have an abundant snow cover in winter and the ice, consequently, does not get as thick as on lakes where, due to lack of shelter, no snow accumulates.

The local distribution of the muskrat is also closely tied up with its food supply and only in lakes that have an abundant aquatic vegetation and a depth of over 12 feet of water do rats winter successfully. Such lakes also are relatively rich in other aquatic life. The realistic Mackenzie delta Eskimo, who told the writer that 'Lake with plenty of rats got plenty of fish too', was aware of this, if not of the underlying cause.

The food of the muskrat, at least during autumn, winter and spring consists of the fruits, rhizomes and winterbuds of pondweeds (*Potamogeton* spp.), rhizomes and tubers of horsetail (*Equisetum arvense*), the rhizomes and fruits of water arum (*Calla palustris*), and duck weed (*Lemna trisulca*). The roots, rhizomes, stems and fruits of a number of other plants, notably sedges and grasses are, no doubt, eaten as well. The Eskimo, who are keen observers, deny that rats eat fish, but say that rats, when "frozen-up" in their houses, often resort to cannibalism.

In the delta, the water level, in lakes connected to river channels, does not remain stationary throughout the winter and towards spring may be much lower than at the time of freeze-up. In such lakes, rats do not depend on burrows in the lake banks but make houses on floating "rafts" or on the ice itself. Large numbers of "push-ups" are seen on all lakes frequented by rats. Often the "push-ups are very large and undoubtedly sometimes take the place of regular muskrat "house or " lodge", and are kept open throughout the winter. For this reason it is important for the rat that an abundant snow fall covers the lake and the push-ups. The principal material used in the push-ups is the leafy-stemmed Richardson's pondweed (*Potamogeton Richardsonii*) and water-milfoil (*Myriophyllum exalbescens*).

Fluctuations in the Mackenzie delta muskrat populations during the years 1926-27 and 1931-36 were not as marked as were, for example, those of the rabbits, lynxes, mice or lemmings, nor did the writer during these years observe instances of diseased muskrats.

However, Mr. Lang informs me that, in the winter 1933-34, he saw many dead rats in feeding houses on the ice in the upper part of the delta. The following spring very few rats were seen in many of the lakes that in the autumn had had large populations of rats. He thinks that the rats had died from some kind of disease. In winters of low water level in the delta many muskrats "freeze out". This is apt to happen also in years when the snow comes late and when, therefore, some of the lakes freeze to the bottom.

Some rats are taken in steel traps, in their "push-ups" on the ice, in the autumn soon after freeze-up, but fall trapping is generally considered bad practice in the North because too many young, under-sized rats are taken. The best prices are obtained for rats trapped in the "push-ups" in early spring, but by far the largest numbers are shot in open water during May and early June when the entire delta is flooded.

The rat hunter then uses a small canoe which can easily be brought into lakes and back channels or through flooded willow thickets. The best time to hunt is during the night and early morning hours when the muskrats are most active. In the latitude of the Mackenzie delta, due to the midnight sun, there is no darkness during the months of May and June. Experienced hunters can "call" the rats, often from a considerable distance, by a high-pitched squeaky note made with the lips. So effective is this call and so fearless or unwary is the muskrat that I have often been able to bring a rat within touch of my hand. Males only respond to the call which is said to imitate the mating call of the female. Personally I have never myself heard a female rat make a sound resembling the "rat-call"; but the fact remains that by far the largest number of animals taken in spring are males. In the Northwest Territories the use of a shotgun is prohibited for rats, as is the use of a dog for retrieving. Caliber .22 rifles are universally used.

The rat hunter starts out at about 10 to 11 p.m. and returns at 5 to 6 a.m., often with a catch of 50-75 rats. A native hunter then can go to bed leaving his womenfolk to skin and stretch the rats while a white hunter, as a rule, must put in several hours at this chore. A good rat skinner will skin and stretch a rat in about two minutes.

Some large lakes, 3 to 4 miles long, in the timbered parts of the delta have been known to yield over 1,000 rats in one spring hunt, but it is by no means certain that these rats were all produced on that particular lake, since muskrats travel extensively during the spring flood.

The writer (Porsild, 1935) has estimated the area covered by the alluvial part of the Mackenzie delta at about 4,000 square miles. With an average catch of 200,000, this gives an approximate maximum yield of 50 rats to the square mile.

In the Mackenzie delta the muskrat, in average years, probably rears but one litter of young, but in favourable years two litters are not uncommon. (Lang).

The flesh of the muskrat is considered choice by Eskimo and Indian alike, and in spring, when fresh meat has been scarce for some months, provides a welcome and much needed change from the staple, but not too healthy, spring diet of the delta natives, which consists of rabbit meat and baking powder biscuits. Well-cooked rat meat, in fact, is quite palatable and is more nourishing that that of the lean spring rabbit.

The Eskimo make excellent and beautiful parkas from the warm and very durable muskrat fur. These parkas are extensively worn by both sexes and by a number of Europeans as well. Sixty large rat skins are required for a man's double parka. The light-coloured belly skins are used for the inside parka, which is worn with the fur next to the body, while the dark back skins are used for the outside parka which is worn with the fur out. Rat parkas are very durable, but somewhat heavier than parkas made from caribou fawn skins.

The muskrat, without question, is the most important furbearer of the delta. Even when all other fur fails, the trapper in the Mackenzie delta, in normal years, can count on a catch of a thousand rats per hunter. In fifteen years of trapping Mr. Lang's largest catch of rats was 2400 and the smallest 900. A number of Eskimo, who have spent the winter trapping foxes on the coast, come to the delta in the spring in order to hunt rats. The total annual catches of rats in the Mackenzie delta, in the years 1926 to 1943 has averaged about 200,000 skins and the delta has thus produced the largest portion of the total rat catches in the Northwest Territories.

**Erethizon dorsatum** Linnaeus;
PORCUPINE;
Eskimo: *Ilagosik.*

This species is very rare in the Mackenzie delta. Mr. Lang took one specimen on the lower Peel in July, 1929 and reports that another was taken twenty miles above Aklavik, on the Husky channel, in 1932[6].

**Lepus arcticus andersoni** Nelson;
BARREN GROUNDS HARE;
Eskimo: *Ukaliq* or *Ukaligssuaq.*

This species occurs sparingly in the Caribou hills and in the higher parts of the Eskimo Lake country. One animal was taken on the East branch near Kittigazuit, in December, 1931. Signs, probably of this species, were seen in the Richardson mountains west of Aklavik in July, 1933 and, on gravel ridges in the foothills between the delta and Shingle point.

The barren ground hare prefers alpine, stony and rockstrewn country and its scarcity in the area is, no doubt, largely due to the absence of suitable habitats. It is too scarce to be of any importance in the native economy.

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6.—The porcupine found in the lower Mackenzie may well be the eastern form, but the Alaska Porcupine, **Erethizon dorsatum myops** Merriam, is equally probable, and specimens of porcupines from this region are very desirable to settle the problems of geographical distribution of the races of porcupines — R. M. Anderson.

**Lepus americanus macfarlani** Merriam;
MACKENZIE VARYING HARE or SNOW-SHOE RABBIT;
Mackenzie Eskimo: *Ukaliq.*

Rabbits were so scarce in the Mackenzie delta during 1927 and 1928 that, in the course of extensive winter travelling in the delta, from November to February, I did not see a single animal and only a few tracks. Three years later, in the winter of 1931-32, more rabbits were seen than in any other year. In 1932-33 rabbits were still plentiful. During the coldest part of the winter dead rabbits were found occasionally. These animals were always in poor condition, but showed no sign of disease and, in my opinion, had frozen or starved to death. In 1933-34-35, a considerable decrease was evident, although fair numbers were taken each year at the Reindeer Station. These were all in good condition and never showed incidence of disease. During the years of greatest abundance rabbits were plentiful practically everywhere in the delta, even in the treeless but willow-covered northern part. In the mountains west of the delta the species was found from the lowland to the timberline, and even in the treeless Eskimo Lake basin rabbits were occasionally seen in willow and alder thickets along lake shores and creeks.

At all times the greatest concentration of rabbits was to be found in the birch-forested, higher parts of the delta. Thus, on the slopes of the Caribou hills on the East branch of the delta, in 1931-32, at least 1,000 rabbits were snared or shot in the immediate vicinity of the Reindeer Station. In spite of this heavy predation, in an area of no more than a few square miles in extent, their numbers did not decrease appreciably until after the break-up when the influx from adjacent parts of the delta across the East branch had been stopped by open water.

Following the winter of greatest abundance there was much evidence of rabbit "chewing" in the vicinity of the Reindeer Station. In May practically all the twigs of alder, as well as the slender twigs of willow and paper birch, that were protruding above the snow and within reach of rabbits, had been completely stripped of their bark. Twigs and branches of the thickness of a man's finger had been chewed completely off. In spite of a fairly heavy snowfall, it was noted that the rabbits, by extensive tunnelling under the snow, particularly in alder and willow thickets, were able to utilize much of the ground vegetation, and even towards spring most rabbits killed here were in good shape.

In addition to the bark of alder, willow and paper birch, the food of rabbits consists of small twigs of ground birch (*Betula glandulosa*), twigs of spruce, and the twigs and evergreen leaves of cowberry (*Vaccinium Vitis-Idaea*).

When not molested, rabbits quickly become tame. Thus, in a secluded ravine near the Reindeer Station where no rabbits were ever shot, they soon learned to come to a feeding station where scraps of bread or oatmeal porridge was placed for them daily. By spring several rabbits here had become so tame that they responded readily to a call and would come to within a few feet of the caller to pick up food.

When rabbits are abundant in the Mackenzie delta, large numbers are used by Indians and Eskimo for dog food, and to a lesser degree for human consumption. In years when rabbits are less abundant, the Eskimo at least do not hunt them except in case of dire necessity, because rabbits at best are considered poor food for man or dog, and, therefore, not to be bothered with unless large hunts can be made with little effort.

During mid-winter the rabbits in the Mackenzie delta show little activity during the day, the greater part of which is spent in the dens or burrows under the snow. During this season the best time for hunting is an hour or so before dark. Rabbits may also be shot after dark, by the use of an electric torch mounted on the rifle. When hunting was good on the East branch, 15 to 20 rabbits could be shot with a cal. 22 rifle in an hour's hunting. Most rabbits, however, are taken by snares set in the rabbit trails. The snaring of rabbits by Eskimo and Indians alike is considered woman's work.

In addition to man, the rabbits of the Mackenzie delta have numerous other enemies, including the lynx, fox, timber wolf, weasel, great horned owl, snowy owl, and the goshawk.

**Alces americana** (Clinton);
MOOSE; Eskimo: *Tuktuvak*

During 1927-28 and 1930-35 moose were rare in the Mackenzie delta and only a few were killed. Numerous signs of moose were seen during the summer of 1927 in the Eskimo Lake region, between Point Separation and the mouth of Kugaluk river.

According to native informants, moose were formerly more abundant and the present scarcity is attributed to excessive hunting and to the absence of large areas not frequently visited by hunters and dog teams. This explanation, no doubt, is correct since the extensive willow flats and sloughs of the lowlands of the forested parts of the region would appear to be first class moose country.

In December, 1931 a moose was killed near the Arctic coast of Alaska not far west of the Alaska-Yukon boundary.

**Rangifer arcticus** Richardson;
BARREN GROUND CARIBOU;
Eskimo: *Tuktu* (collective name), *Pagniq* (bull caribou), *Kulavak* (doe), *Norraq* (fawn).

For a number of years preceding 1927, caribou had been scarce in the Mackenzie delta region, although some were obtained each winter in the mountains west of McPherson and south of Herschel island. In the country east of the delta, as well as in the larger and higher islands north of the delta, caribou were common about 20 years before, but had since disappeared entirely. In many places on the Caribou hills and in the Eskimo lake basin deep-worn trails were still clearly visible in 1927 and 1928, and testified to the former presence of numerous caribou.

Caribou, *Rangifer arcticus stonei* Allen, were first observed by natives west of the delta in July, 1927. In August and September the numbers had increased until, in October, the low hills between the forested delta and Richardson mountains were literally covered by a vast herd of caribou slowly moving in a southerly direction. This migration was thought to have come from interior northeastern Alaska and to have moved east along the coastal plain to the Mackenzie valley, whence it turned south following the eastern slopes of the Richardson mountains. Stragglers were said to have entered the wooded river valley above the delta and a few animals may actually have crossed the Mackenzie river near Point Separation or at Arctic Red river. The body of the migration, after New Year, began to move west through the Rat-Bell River pass. By January this herd, which by some observers was estimated at "millions of head", had become divided into numerous smaller herds which were now scattered throughout the foothills west of McPherson. In the country, through which this migration had passed, the snow everywhere was trampled hard by the passing deer. In the winter 1931-32 caribou were again plentiful on the Arctic coast between Herschel island and the delta. A few animals crossed on the ice near the northern edge of the delta, landing on the eastern mainland near Tununuk. The following winter caribou were rather scarce west of the delta and none were reported on the Arctic coast. In September a few fresh tracks of caribou were seen on the East branch, which were thought to have been made by the animals that had crossed the previous winter. In July and August of 1933 and 1934 caribou were fairly numerous in the mountains west of Aklavik. Except as stated above, no caribou were seen or reported east of the delta during the years of my residence.

Caribou seen north and east of Great Bear lake, during 1928, were definitely smaller than the caribou west of the delta and probably belong to the subspecies *arcticus*. The caribou, which formerly occurred east of the delta, no doubt were the same race as the present day Bear lake caribou. In the winter of 1927-28 a few small herds wintered on the north shore of Great Bear lake. One female which was shot in Dease bay, April 15, measured: L. 5 ft. 7 in; H. 3 ft. 8 in; the foetus was fully developed but still without hair. Last year's fawn still followed the mother.

Late in April the advance guard of the main northward migration crossed Dease valley. Early in May small herds of females and young bulls were observed near Dismal lakes, slowly moving north. The foetus of a doe killed on May 3 was full-grown and fully haired. One 2-year bull measured L. 5 ft. 7 in; H. 3 ft. 8 in. The females, as well as all young bulls seen, still had their antlers.

Several bulls seen near the headwaters of the Horton river, on June 22, were shedding their winter coats and were dropping their warble fly grubs.

Old Mackenzie delta natives informed me that some caribou formerly remained on Richards island throughout the year, and that, in winter, caribou could, as a rule, be found within one day's travel south by dog team from the Arctic coast east of the delta. This country is now part of the Reindeer Grazing reserve and is partly stocked with domesticated reindeer.

The caribou formerly was an important

animal to the Eskimo and Indians of the Mackenzie delta region and supplied a large portion of their requirements of meat. The caribou also provided the finest material obtainable for winter clothing and sinews for sewing of skins of all kinds. Domesticated reindeer now supplies most of the wants of the natives of the region, in addition to supplying meat and skins to some white residents of the country.

**Rangifer caribou sylvestris** (Richardson);
WESTERN WOODLAND CARIBOU.

Woodland caribou do not normally occur in the Mackenzie delta region, but have been reported by Indians from the wooded country south of the Eskimo lakes.

**Ovibos moschatus moschatus** (Zimmermann);
MUSKOX;
Eskimo: *Umingmak.*

No muskox have been seen within the area in the memory of any present day Eskimo; nor were skulls or horns ever encountered in the course of my travels in the district.

**Ovis dalli dalli** (Nelson);
MOUNTAIN SHEEP;
Eskimo: *Imneq.*

During my residence in the delta, moutain sheep were tolerably common in the mountains west of the delta, and some sheep meat was traded each year at Aklavik. The nearest place where sheep can be shot is on Black and Grey mountains about 20 miles southwest of Aklavik; but experienced hunters claim that sheep can nearly always be found within a day or two's travel west of the delta.

Mr. Lang, who has had considerable experience with mountain sheep, tells me that sheep appear to shun caribou. When herds of caribou appear in the foothills west of the delta the sheep disappear, only to come back when the caribou have moved on.

**Balaena mysticetus** Linnaeus;
BOWHEAD OR GREENLAND WHALE;
Eskimo: *Aqveq.*

The bowhead whale was formerly of great importance when the high prices commanded by whale "bone" brought large fleets of whaling ships to the Beaufort sea. The last whaling ships, according to Anderson (1913), visited the region in 1912.

During my residence in the Mackenzie delta, bowhead whales were occasionally reported seen from Herschel island and from schooners travelling east along the Arctic coast. But since these schooners rarely venture far out to sea and because the whales are now of no importance to present day Eskimo, little is known of the present status of this interesting species.

**Delphinapterus leucas** (Pallas);
BELUGA, WHITE WHALE;
Eskimo: *Sissuaq;* Kittigazuit dialect: *Qilalugaq.*

Belugas appear regularly and in very large numbers along the coast and in estuarial waters of the delta during July and August, when some ascend the larger branches of the delta for a short distance and are said to have been observed as far up as Point Separation at the head of the delta. On the East branch large flocks were frequently observed as far as Tununuk.

Belugas are hunted by the Eskimo from whale boats that approach under sail. The animals must be harpooned immediately after being shot because they sink at once, due to the low specific gravity of river water. Although the depth rarely exceeds 10 feet, the water is always so muddy that a sunken animal is invariably lost.

In 1927, the Kittigazuit tribe took about two dozen belugas which perhaps is a normal catch, although much larger numbers could be taken, if desired.

The skin (*maktak*) here as elsewhere is a favourite food and large quantities are eaten raw. The surplus is cut into strips and partly dried, and later preserved in the oil. The meat is very palatable and is used fresh or dried. The blubber is cut into strips which are placed in sealskin bags or in oil barrels, where the oil is rendered simply by exposing the barrel to the heat of the sun. The oil is used for food during the winter.

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# CURRENT LITERATURE

The Wolves of North America. *Part I,* Their history, life habits, economic status, and control, *by Stanley P. Young;* Part II, Classification of wolves, *by Edward A. Goldman. 8vo., XX+636, pls. 1 - 131; 15 text figs. The American Wildlife Institute, Washington, D. C., 1944.*

Mr. Young was for many years a hunter for the United States Government. Much of the first part of the present volume is devoted to showing what destructive creatures wolves are, and to methods of destroying them.

In Part II Major Goldman gives a comprehensive review of the races of the two species of wolves in North America, with plates of the skulls of many of them. There is a bibliography of 81 pages. — A. L. Rand.

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The Wolves of Mount McKinley. *By Adolph Murie, U.S. Govt. Printing Office, Washington, pp. XIX + 238, many illustrations.*

Based on two and a half years' study, this paper presents a first-class, readable, and attractively illustrated account of the wolves in relation to other animals in a national park. This is a basic type of work necessary for game administration, and the present example is an important contribution to natural history — A. L. Rand.

# CURRENT LITERATURE

ECONOMIC STATUS OF THE PHEASANT ON THE CULTIVATED LANDS OF THE OKANOGAN VALLEY, BRITISH COLUMBIA. *By Ian McTaggart Cowan. Prov. B.C. Rept. Prov. Game Commission for 1942, Victoria, pp. M49-M60.*

An investigation, including stomach analysis and field work, into the complex relationships between the good points of the pheasant, its value as sport, food, in providing the basis for shooting rights to be leased, and as a controller of insect and weed pests; and its bad points in destroying crops. The conclusion is that damage to crops by pheasants is seldom sufficient to merit control, and such instances are local and sporadic.

— A. L. RAND.

# POLYPODIUM VIRGINIANUM IN AN EPIPHYTIC HABITAT [1, 2]

*By* R. M. LEWIS
*Kentville, N. S.*

IN COMPANY with Mr. E. Chesley Allen, of Halifax, the writer visited the region between Scots Bay and Cape Split (Nova Scotia) on July 9, 1943. Several colonies of a fern, assumed to be *Polypodium virginianum* L., were observed, established in the crotches of old dead snags of *Betula lutea*, at heights varying (by estimate) from 20 to 50 feet above ground level. No collections were made of these aerial ferns at that time.

Some months later, the writer's attention was drawn to Fernald's comments (1) on *Polypodium* in Yarmouth County, "climbing the tree-trunks, the creeping rootstocks ascending in the crevices of the bark to a height of 2 or 3 meters."

It is clear that "climbing" habits may differ in character from the relatively stationary existence of a plant established in an elevated tree-crotch. Nevertheless, Fernald stated (2) that "*P. virginianum,* though very rarely epiphytic, is ordinarily a plant of rock-habitats." It seemed desirable to re-visit the Cape Split area for the purpose of verifying the assumption that the plant observed was *P. virginianum,* to make further observations on the elevation of the epiphytic colonies, and to make some note of the frequency with which the phenomenon occurred.

Accordingly, on June 29, 1944, in company with two agile assistants, the writer went again to Cape Split. The region consists of a narrow peninsula, lying approximately east and west, extending into the Bay of Fundy, four miles long and one mile across, with Cape Split proper at the western extremity. Along the north side, a 300-foot cliff faces Minas Channel. A ridge of some 400 feet elevation runs parallel to the cliff-edge, and only a short distance inland from it. Toward the south, the land slopes gradually to the shore of Scots Bay, dropping at last in a cliff of some twenty to fifty feet. The long southerly slope is covered chiefly with coniferous second-growth forest. Along the ridge, and on the narrow slope between the ridge and the Minas Channel cliff-edge, are the remains of an old hardwood forest, and among these old, mostly dead, trees is an abundant cover of young hardwoods, chiefly birch and maple. The old birch snags provide the habitat for the epiphytic *Polypodium.*

Collections were made at two sites, one elevated 25 feet, the other 40 feet, above ground level. Part of each collection was preserved by drying, and part of each has been potted and grown in the greenhouse. Comparison of Cape Split collections with Fernald's Key to *Polypodium* Species in North America (3) is shown in the accompanying table.

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[1] —Contribution No. 794 from Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.
[2] —Received for publication August 25, 1944.

Table showing comparison of Cape Split collections of *Polypodium* with key descriptions of *P. vulgare* and *P. virginianum*.

| Structure | *P. vulgare* L. (Fernald's Key) | *P. virginianum* L. (Fernald's Key) | Cape Split collections |
|---|---|---|---|
| Rhizome | firm, sweet | soft, spongy, not sweet | rather firm;acrid not sweet |
| diameter | 5-10 mm. | 2 - 7 mm. | less than 5 mm. |
| Rhizome scales | pale cinnamon to castaneous, uniformly colored (or darker at base) | darkened in the back | slightly darker in centre than at margins |
| | densely cellular | loosely cellular | loosely cellular |
| | cell-walls thin | cell walls thick | cell-walls about 8 u thick |
| | peltately attached | cordate at base | cordate at base |
| length | 5-10 mm. | 2 - 4.5 mm. | 3 mm. |
| Stipes, diameter | 1 - 3 mm. | 0.6 - 1.7 mm. | not over 1.5 mm. |
| length | 0.2 - 3 dm. | 0.1 - 2 dm. | 6 - 8 dm. |
| Fronds, length | 0.2 - 5.5 dm. | 0.25 - 2.6 dm. | 1 - 1.2 dm. |
| breadth | 1 - 24 (av. 11) cm. | 1.5 - 7 (av. 4) cm. | 4 - 5 cm. |
| Pinnae | opposite; subopposite or alternate | alternate or the lowest sub-opposite | mostly alternate; in a few fronds, opposite |
| length of lowest | shorter than medians | as long as or longer than the medians | slightly longer than the medians |
| breadth of median pinnae | 2 - 20 mm. | 2 - 8 mm. | 7 mm. |
| median to upper midribs | curving | straight | mostly straight |
| Sori | commonly median | nearly marginal | approx. midway between midrib of pinna and its margin |

There appears to be little room for doubt that the *Polypodium* collected at Cape Split is in close agreement with Fernald's description of *P. virginianum*. The chief points of lack of agreement are points that are difficult to assess without reference to material representing both species; for example, the relative "firmness" of the rhizome, and the "nearly marginal" position of the sori. With respect to the arrangement of the pinnae as "mostly alternate; in a few fronds opposite", it is pointed out that this occurrence of infrequent fronds in which the pinnae are opposite has been found in *P. virginianum* on normal rock-habitat in this region elsewhere than at Cape Split. It was noted with some care that the opposition was exact, and that the term subopposite would not be suitable to use in describing such pinnae.

In the area visited, it was estimated that about one tree in ten of the old "ghost-forest" snags harboured one or more colonies of *Polypodium*, at heights varying from 15 to 50 feet above the ground level. In the course of a couple of hours' tramp, between 20 and 30 such colonies were observed.

In the course of a later visit to the vicinity of Hall's Harbour, King's County, Nova Scotia, at a point some nine or ten miles distant from the Cape Split area, a number of similar epiphytic colonies of *P. virginianum* were observed on old hardwood trees that had fallen and were lying across the course of a brook.

## SUMMARY

In the crotches of old dead hardwood trees in the Cape Split area, King's County, Nova Scotia, and at least one other nearby station, *Polypodium virginianum* L. grows as an epiphyte at estimated elevations up to 50 feet above ground.

## LITERATURE CITED

(1) —Rhodora 23: 147, 1921.
(2) —Rhodora 23:133, 1921.
(3) —Rhodora 24: 125-142, 1922.

# THREE APPARENTLY UNRECORDED FRESH-WATER FISHES OF BRITISH COLUMBIA[1]

*By* G. CLIFFORD CARL
*Provincial Museum, Victoria, B. C.*

IN THE COURSE of gathering information concerning the fresh-water fishes of this Province at least three species have been discovered which are apparently unrecorded in the literature as being present in British Columbia. The species noted herein may be considered as a supplement to Dymond's account "Some Fresh-water Fishes of British Columbia" (Rept. Comm. of Fish. B. C., 1935, pp. 60-73.)

### Black Catfish.

*Ameiurus melas* (Rafinesque). — Several specimens of this catfish were taken from a pond adjoining Osoyoos Lake in the Okanagan Valley at Osoyoos, B. C., on May 22-23, 1941. This appears to be the first authentic record for this species in British Columbia; previous records, such as those in the Report of Provincial Museum for 1931 (1932, p. 13) undoubtedly referred to the brown catfish, *Ameiurus nebulosus* which appears to be the only species present in the coastal area.

### Pike-Perch.

*Stizostedion vitreum* (Mitchill). — The presence of pike-perch in British Columbia waters has apparently not been recorded hitherto although this species has been reported as possibly occurring in drainage systems in the northern portion of the Province. A specimen taken by Game Warden W. O. Quesnel in the Peace River, about one mile below Taylor on July 21, 1943, confirms the presence of pike-perch in this Province. Through the courtesy of the Provincial Game Department, reports have been obtained of the presence of this fish in the following bodies of water: Klua Lakes (about 45 miles south of Fort Nelson), Muskwa (Sikanni) River (tributary to Fort Nelson River) and Beatton and Kiskatinaw (Cutbank) Rivers (tributaries to Peace River).

### Goldfish

*Carassius auratus* (Linnaeus). — Wild goldfish are present in a pond of about seven acres at Salmon Arm near Shuswap Lake and in a pond of similar size near Lac du Bois, 17 miles northwest of Kamloops. According to Mr. E. R. Buckell, Entomologist in Charge of the Field Crop Insect Laboratory at Kamloops, goldfish were first noted in the Salmon Arm pond in 1935; they increased rapidly in numbers, reaching a population peak in 1941. At this time the pond presented a strange sight, the fish forming a dark gold band around the edge when they congregated close to the surface in the shallows. Large numbers were taken by mergansers and ospreys but many fish still are present; some are said to be well over a pound in weight.

Since the Salmon Arm pond is said to drain by way of a ditch to Shuswap Lake it is possible that in time goldfish will be found in this body of water also if they are not already present.

I am indebted to J. R. Dymond of the Royal Ontario Museum of Zoology for confirming the identification of the black catfish and to Commissioner F. R. Butler for assistance in acquiring a specimen of the pike-perch. I wish also to thank Fishery Officer W. M. Ferrier of Kamloops for specimens of goldfish from his district.

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[1] —Received for publication June 29, 1944.

# HUNGARIAN PARTRIDGE IN THE OTTAWA-MONTREAL AREA[1]

*By* A. L. Rand,
*National Museum of Canada*

The Grey or Hungarian Partridge, (*Perdix perdix*) has been successfully introduced as a game bird in a number of provinces in Canada: on the prairies; in southern Ontario; in Prince Edward Island, and in Nova Scotia. In 1936 Baillie and Harington (*Trans. Roy. Can. Inst.*, 21, pp. 29, 30) briefly summarized its introduction in Ontario, where since about 1909 introductions have been made from Essex east to Leeds and north to Muskoka and North Frontenac. They say it may increase and spread through most of southern Ontario.

The Ottawa-Montreal area is on the northern edge of the country that appears suitable for Hungarian partridge. The first published report of the species for the Montreal area (and for Quebec) was by Terrill in 1943 (*Prov. Que. Soc. Prot. Birds Ann. Rept. for 1942*, pp. 15, 16) and it appears to be unrecorded for the Ottawa area.

Manuscript notes, accumulated in the National Museum of Canada through the kind offices of its many friends mentioned below, allow us to outline the status of the birds in the Montreal-Ottawa area up to 1944, as follows:-

Quebec, north of the Ottawa River:

*Gracefield.*— Mr. E. F. G. White tells me he secured 42 birds from Saskatchewan for the Ottawa Fish and Game Society. They were kept in an open fronted shed all winter and they were liberated in the spring about 1938.

About six nests were reliably reported that summer, and it would seem that the birds were fairly well established. That fall there were a few vague records. None was made the following year. Two birds seen the next summer were the last heard of in this area. Mr. White felt that the cooperation of the local people would have recorded the birds if present, and it seems that they have disappeared.

Ontario south of the Ottawa:

*Kemptville.*— Mr. A. E. Bourguignon saw a flock of 21 and collected one the last week of October, 1943.

Mr. P. E. Palmer of Ottawa tells me that in January and February, 1943 he saw a covey of 15 to 20 birds feeding about haystacks.

Mr. W. Page told me that a correspondent of his had 2 or 3 Hungarian partridge about his farm house in January, 1944, while in previous years he had had numbers of them.

*Burritt's Rapids.*— Mr. White tells me that in 1941 a covey of as many as 14 birds was reliably reported from this locality, and Mr. White saw a covey of 18 birds that fall. He also said that Mrs. Kidd of Burritt's Rapids fed a flock of 10 to 12 of these birds all winter (1941-42). About May 1, 1942, Mr. White had a report of two seen near there.

There is no suggestion of an introduction there, and they may have spread here from the south.

*Hawthorne.*— One large flock was reported by J. Skillen as seen by Bill Joy in September and October, 1943, but not seen during the following winter.

*Kars.*— Two flocks of at least 12 each were seen in October, 1942, by J. Skillen.

*Ottawa.*— Mr. White tells me that a number were released on the Connaught Rifle Range about 1938, and all seemed to have disappeared. However, Mr. C. Taylor told me that in the winter of 1941-42 he had seen a flock of 25 birds near the rifle range, and in April, 1942, I saw a pair of birds in the Experimental Farm Arboretum, indicating that a few may have survived.

*Casselman.*— In 1942 Mr. White heard of several birds having been found frozen there about 1939. He was of the opinion that there had been a local introduction that had failed.

Mr. J. L. Kemp of the Ottawa Fish and Game Society writes me under cover of May 19, 1942 that an introduction was made at Casselman by private individuals, but has no additional information.

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1.—Received for publication June 9, 1944.

*Vankleek Hill.*— Mr. L. J. Sylvestre of that place sent to the National Museum two specimens found dead on the railway tracks and wrote on March 11, 1943, saying that they were common.

Mr. G. G. Ommanney of Montreal visited the locality in April and wrote me that according to local information the birds were quite plentiful a short distance east of the Vankleek station; and Mr. Bourguignon had reports of them being present in the summer of 1943.

*Maxville.*— Mr. P. E. Palmer of Ottawa tells me that he has reliable information of a large flock having been seen near Maxville in October, 1943.

*Vaudreuil-Soulanges area, P.Q.*— The partridge apparently became common in this area. There appears to have been no local introduction and they seem to have spread from the west; they seem to have disappeared after the severe winter of 1942-43.

Terrill (1943, *Ann. Rept., Prov. Quebec Soc. Prot. Birds* for *1942*, Montreal, pp. 15, 16) giving the first published records of the species for Quebec, writes that a covey of seven were seen at Como on Dec. 27, 1942, and birds were seen at Coteau, in the fall of 1942.

For this area I have additional data. Mr. B. L. Lukis wrote me on May 2, 1942, that since Oct. 1941, there was a covey about the village of Choisy. In January, 1943 he wrote that the covey of the preceding winter paired and bred in the spring, and there were then at least three covies he had located, extending from Rigaud Mountain to St. Lazare. The severity of the winter was having its effects, as a covey of twelve, located on the farm of Mr. N. M. Yuile, between Como and St. Lazare was then reduced to seven, and two of these were too weak to fly. One bird out of a covey near Rigaud died, and was sent to the Museum by Mr. Lukis. Later on Feb. 24, 1943, Mr. Lukis wrote me that the covey on Mr. Yuile's farm was reduced to three, and the two birds that had been too weak to fly, have been cared for and recovered and turned loose. Mr. Terrill and Mr. Ommanney have no further record of them in the Montreal area.

*Quebec, south of the St. Lawrence, near Montreal.*— The Hungarian partridge were apparently fairly well established in this area in 1942, as the following data from Terrill (l. c.) indicate:

*Caughnawaga.*— several covies, totalling 31 individuals seen Dec. 26, 1942.

*Ste. Martine.*— several covies seen in January, 1943.

*Rougemont.*— six birds seen on Feb. 14, 1943.

*Valleyfield.*— several seen during the fall of 1942.

According to Terrill thirty-two pairs of these birds were liberated near Sutton in 1932; they apparently increased in 1933 and 1934 and were seen at Knowlton, Johnville and Sutton. No trace of them has been seen since and the birds noted above as seen in 1942 probably were not from this introduction.

However Mr. Terrill (letter, Mar. 6, 1944) has heard no word of the Hungarian partridge in the Montreal area since the above records.

Experienced sportsmen such as Mr. White who know the Hungarian partridge withstood more severe cold on the prairies than we have at Ottawa, are doubtful that the bird will thrive in the Ottawa-Montreal area. This is because the Hungarian partridge is a ground feeder. They believed that it might survive normal winters, but ones with deep snow would cause it to starve to death. The history of the birds in the last few years has vindicated this view in part.

Introductions south-west of Montreal in 1932, and north of Ottawa about 1938 appear to have been unsuccessful. Those near Ottawa were of doubtful value. But just previous to 1942 the birds seem to have spread northward to Ottawa, and eastward to Montreal, probably from areas in southern Ontario, in considerable numbers. Then came the severe winter of 1942-43 and with it unusually deep snow. The birds seem to have disappeared from the Montreal area, and to have sharply decreased in the Ottawa area, though they were fed by friendly farmers.

However, the species has survived on the southern edge of our area, from Kemptville to Vankleek Hill, and it is possible that a limited population may become acclimated in this area, as has happened with the pheasant.

# SOME MARINE FISH RECORDS FOR BRITISH COLUMBIA [1]

*By* G. CLIFFORD CARL AND G. V. WILBY

*Director, Provincial Museum, Victoria, B. C.*

and

*Research Graduate, Department of Zoology, University of British Columbia, Vancouver, B.C.*

IN THE COURSE of cataloguing the collection of marine fishes in the Provincial Museum Victoria, British Columbia, several fishes have come to light which apparently have not yet been recorded as occurring within the Province or which are of special interest on account of their rarity or for some other reason. Those deserving of attention are included in the following list of notes. Most of these fishes have been examined by Dr. W. A. Clemens of the Department of Zoology, University of British Columbia; we are indebted to him for his assistance in identifying specimens and for permission to refer to fishes in the University collection. We are also grateful to Dr. R. E. Foerster, Director of the Pacific Biological Station, Nanaimo, for permission to refer to specimens in the Station collection and to Dr. L. P. Shultz, Curator of Fishes, United States National Museum, for identification as acknowledged in the text.

### *Hexanchus griseus* (Bonnaterre)

### MUD SHARK

While the mud shark is common in British Columbia coastal waters only one specimen appears to be available for study. This is an individual measuring 7 feet, 2 inches in total length, taken in Saanich Arm, Vancouver Island by Mr. P. Stacey on October 16, 1941, and now Number 402 in the Provincial Museum collection. The species was first recorded from Provincial waters in 1926 as *Hexanchus corinus* Jordan and Gilbert by O'Donoghue and Bolton (Journ. Anat. **61**: 40-63).

### *Raja kincaidii* Garman

### BLACK SKATE

Two specimens of this fish, Numbers 393 and 394, taken by G. C. Carl in Satellite Channel on February 26, 1941, are in the Provincial Museum collection. A specimen in the University collection was taken on December 11, 1936 in Trincomali Channel near Porlier Pass by J. L. Hart. This appears to be the first specimen collected in British Columbia waters for which complete data are available; there are two specimens in the United States National Museum (number 77494) taken at Oval Bay, Porcher Island, by W. F. Thompson but no date is given (Copeia, 1937, No. 4, pp. 235-236).

### *Peprilus simillimus* (Ayres)

### CALIFORNIA POMPANO

A specimen taken in British Columbia waters in September, 1903, in Juan de Fuca Strait was first recorded as *Palometa simillima* Ayres (1909, Visitors' Guide to the Natural History and Ethnological Collections in the Provincial Museum, Victoria B.C., p. 87); it is now number 238 in the collection. Other records are as follows: two fish (Provincial Museum collection numbers 181 and 182) 1908, Victoria, B.C.; one fish (Provincial Museum collection, number 183), August 28, 1941, Sooke Traps, Sooke, V.I.; one fish (Pacific Biological Station collection) December 15, 1940, off Chemainus River in trawl.

### *Sarda lineolata* (Girard)

### BONITO

Two specimens of this fish are in the Museum collection number 284 (cast), Rivers Inlet, September, 1900, and number 354, Otter Point, Sooke, (no date). They were first recorded as *Sarda chilensis* Cuvier and Valenciennes in 1909 (*loc. cit.*, p. 91).

### *Pholis laetus* (Cope)

### BRACKETED BLENNY

A single example of this species, number 319, was taken on March 20, 1925, at Victoria by C. F. Newcombe.

This species appears to have been first collected at Union Bay, Vancouver Island on June 23, 1903, by the "Albatross" expedition and is represented by specimen number 60250 in the U. S. National Museum collection. Other known occurrences include Fort Rupert and Matlakatla, June 25, 1903.

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[1] —Received for publication October 2, 1944.

### *Lycodes palearis* Gilbert
### WATTLED EELPOUT

This species is represented by the following: two specimens (Provincial Museum collection, numbers 335 and 336) February 26, 1941, Satellite Channel, in otter trawl at 30-40 fathoms by G. C. Carl; two specimens (University of British Columbia collection) (a) January 17, 1934, Active Pass, in 40 fathoms by John Shannon and (b) February 27, 1942, Active Pass, in otter trawl at 35 fathoms.

### *Aprodon cortezianus* Gilbert
### BIG-FINNED EELPOUT

An adult female in the Provincial Museum collection (number 613) taken in June, 1944, by Mr. G. H. Smith in an otter trawl at 50 fathoms in Barkley Sound appears to provide the first record for this species north of California.

### *Pneumatophorus diego* (Ayres)
### PACIFIC MACKEREL

Two specimens, taken at Nanaimo in November, 1904, were recorded in 1909, (*loc. cit.* p. 91) as *Scomba colias* Gmelin; they are now numbers 285 and 473 in the Museum collection. The species is often abundant off the west coast of Vancouver Island and occurs occasionally in Georgia Strait.

### *Decapterus polyaspis* Walford & Myers
### SCAD

This newly described species (Walford, L.A. and G.S. Myers, Copeia, 1944, No. 1, pp. 44-45) is represented in the Provincial Museum collection by one specimen, number 387, 23 inches in total length. It was taken off the west coast of Vancouver Island about July 28, 1941, and presented to the Museum by the Kyuquot Trollers. The species was first recorded in British Columbia as *Trachurus symmetricus* (Ayres) (Anon. 1934, Progress Report Pac., No. 21, p. 6).

### *Zaniolepis latipinnis* Girard
### LONG-SPINED GREENLING

This fish was first listed in 1898 (Preliminary Catalogue, Provincial Museum, Victoria, B C.) and again in 1909 (*loc. cit.*). The specimens referred to are probably those labelled "Straits of Georgia, B.C., 1889" (number 125) and "Victoria, B.C., 1890" (numbers 241 and 242). Other specimens or records are as follows: numbers 124, Alberni, B. C., September 17, 1918 and number 126, Saanich Arm, Vancouver Island, March 19, 1941, collected by A. A. Sherman, Dominion Fisheries Inspector (Provincial Museum collection); one specimen at Pacific Biological Station taken south of Nanaimo, February 8, 1940; one specimen in the University collection taken at Nanoose Bay, November 10, 1941 by E. Bostrom.

### *Microstomus pacificus* (Lockington)
### SLIME FLOUNDER

Large numbers of this small flat fish are often taken in otter trawls but they are usually of small size and of little commercial value. One specimen, number 383, in the Provincial Museum collection, is remarkable for its large size, measuring 23½ inches in total length. The fish was taken off the west coast of Vancouver Island in August, 1941; the identification has been confirmed by Dr. L.P. Shultz.

### *Remilegia australis* (Bennett)
### WHALE SUCKER

Three specimens of this fish were taken in June 1907, at Sechart, west coast of Vancouver Island from a sulphur bottom whale by Thomas Kermode. At that time the species was identified as *Remora remora* L.; the specimens were so labelled and were recorded as such by Schultz and Delacy (1936, Mid-Pac. Mag., April-June, p. 138). In the course of a more critical examination of museum fishes, Dr. W. A. Clemens and the second author re-examined these specimens and identied them as above.

This species has been reported previously from the Indian Ocean, from the Atlantic southwest of the Cape Verde islands and from the coast of Texas in the vicinity of Corpus Christi (Woods, Loren P., Copeia, 1942, No. 3, p. 191). The present record appears to be the first for the Pacific Ocean.

The specimens are about 8 inches in total length. Numbers 235 and 237 are in the Museum collection; the third specimen is in the University collection.

### *Mola mola* (Linnaeus)
### OCEAN SUNFISH

This fish of southern waters is occasionally found off the west coast of Queen Charlotte and Vancouver islands in the summer months. The first specimen to be recorded in British Columbia waters appears to be one taken at Ucluelet on July 14, 1915 (1916 Prov. Mus. Rept. for 1915, p. 16) represented by a cast, number 262. A second specimen taken off the west coast of Vancouver Island, in August, 1941, is number 396 in the Museum collection.

Other records are: one specimen, taken off Princess Royal Island in 1916 by C. Stewart (1917, Prov. Mus. Rept. for 1916, p. 20), one specimen taken at Clayoquot Sound, July, 1926 (Willamson, 1930, Can. Field-Nat. 44: 153) and one specimen (skin only) taken off the west coast of Vancouver Island in 1931, in the Pacific Biological Station collection.

### *Trachypterus rex-salmonorum* Jordan and Gilbert

### KING-OF-THE-SALMON

This rarely seen fish is represented by four specimens in the Provincial Museum: number 267 (cast only) from a specimen taken at Sheringham Point fish trap in 1907; number 353, taken in the same trap in August, 1908; number 495 taken in an injured condition in shallow water at Gonzales Bay, Victoria, B.C., on May 11, 1942 by James Zwinger; and number 572, taken off Sooke Harbour on February 6, 1943, by John Robillard on a spoon while trolling for salmon.

An illustration of the first noted specimen (number 267) appeared in Report of the Provincial Museum for 1912 (1913) and was further recorded by H. W. Fowler (1923, Proc. Acad. Nat. Sci. Phila., 75: 279-301).

The only other examples known to have been taken in British Columbia waters are three specimens: one, slightly over 6 feet long found January 20, 1935, on the beach at Pender Island by George Logan; one measuring 5½ inches in length, captured in June 1941 at Nootka, Vancouver Island; one 5½ feet in length taken off Barkley Sound by J. L. Hart in 1943 (1943 Progress Reports, Pac., No. 56). All of the latter group are in the collection of the Pacific Biological Station at Nanaimo.

### *Gilbertidia sigalutes* (Jordan and Starks)

### SOFT SCULPIN

A specimen of this fish (number 322 in the Museum collection) was taken from the stomach of a handsaw fish, *Alepidosaurus aesculapius* Bean, captured 8 miles off Kains Island, mouth of Quatsino Sound in July, 1937. A second specimen (University collection) was taken by G. V. Wilby in English Bay, Vancouver, at 35 fathoms, May 23, 1936. These appear to be the only records of this fish being taken in British Columbia waters.

### *Chilomycterus affinis* Gunther

### BURR-FISH

A specimen of this fish was found on Dallas Road beach, Victoria, B.C., in July, 1939, by two small boys who brought it to the Museum. Dr. I. McTaggart Cowan, Assistant Director at that time reports that the specimen appeared to have been dead for some time but that the fins and portions of the skin were still soft and pliable. Since there appear to be no other records of this species north of San Diego, California, and since there is some possibility that the present specimen drifted into British Columbia waters in a lifeless condition or was discarded by a local collector, it is thought to be inadvisable to include it in the check-list of British Columbia fishes until more data are available.

The specimen in question measures 2⅛ inches in length in the dried condition and is number 317 in the Museum collection.

### *Sebastodes rubrivinctus* (Jordan and Gilbert)

### SPANISH FLAG

A pair of these fishes in the Museum collection (numbers 638 and 639) were found in the local fish market by H. H. Peglar of the Museum staff; they had been taken about November 15, 1944, in the vicinity of Barkley Sound at a depth of about 150 fathoms by a Mr. Torraville. Another specimen, taken at the same time and place is in the University collection. These specimens confirm the only other record for the species in British Columbia based on examples taken at Porcher Island. (Shultz and DeLacy, *loc. cit.*).

# CHRISTMAS BIRD CENSUS — 1944 [1]

PORT MOUTON, QUEEN'S CO., NOVA SCOTIA.— December 31, 1944; 10.00 a.m. to 4.00 p.m. Fine clear morning, no perceptible wind; cloudy afternoon; slight easterly breeze; traces of crusted snow; temp. 16° F. at start, 33° F. at 4.00 p.m.; two observers together, within a radius of approximately five miles of Port Mouton; 5 miles by car to Port Joli Harbor; rest of time on foot. Common Loon, 1; Red-throated Loon, 2; Holboell's Grebe, 5; Horned Grebe, 1; Canada Goose, 4000 to 5000; Black Duck, 500 to 600; American Golden-eye, 20; Buffle-head, 2; White-winged Scoter, 7; Surf Scoter, 20; Red-breasted Merganser, 2; Bald Eagle, 1; Black Gyrfalcon, 1; Canada Spruce Grouse, 1; Nova Scotia Ruffed Grouse, 1; Great Black-backed Gull, 2; Herring Gull, 25; Great Horned Owl, 1; Canada Jay, 3; Blue Jay, 1; Northern American Raven, 8; Eastern Crow, 25; Black-capped Chickadee, 5; Acadian Chickadee, 2; Brown Creeper, 1; Eastern Golden-crowned Kinglet, 1; Slate-coloured Junco, 7. Total, 27 species, 4645 individuals.— Dr. H. F. Tufts and Cecil Leslie.

HALIFAX, NOVA SCOTIA.— December 27, 1944; 1.00 p.m. to 6.30 p.m.; cool, clear; light north-west wind until 4.30 p.m.; temp. 14°F. at 1.00 p.m., 18° F. at 6.30 p.m. About city, Long Lake and St. Margaret's Bay. Horned Grebe, 4; American Golden-eye, 3; Barrow's Golden-eye, 30; Buffle-head, 1; White-winged Scoter, 1; American Scoter, 2; American Merganser, 3; Ducks (unidentified), 6; Bald Eagle, 1; Ruffed Grouse, 4; Iceland Gull, 1; Great Black-backed Gull, 3; Herring Gull, 123; Ring-billed Gull, 20; Murre (sp?), 3; Blue Jay, 6; Raven, 6; Crow, 34; Black-capped Chickadee, 16; Starling, 15; English Sparrow, 30. Total, 20 species, 324 individuals. The number of land birds has been very much reduced, due to a very dry summer, which resulted in the non-fruiting of many of the plants.— Roger G. S. Bidwell and Gillian M. G. Bidwell.

WOLFVILLE, NOVA SCOTIA.— December 30, 1944; 9.30 a.m. to 5.00 p.m. Partly clear; partly overcast; a few inches of crusted snow; light west wind; temp. minus 5° F. at start; about 0° F. at finish. Three observers; sometimes together, sometimes separated. Observations made within a radius of 10 miles of Wolfville. Travelled chiefly by auto with numerous side trips on foot. Black duck, 22; Green-winged Teal, 3; American Common Merganser, 9; Sharp-shinned Hawk, 1; Eastern Red-tailed Hawk, 1; Nova Scotia Ruffed Grouse, 1; European Partridge, 17; Common Pheasant, 12; Wilson's Snipe, 3; Herring Gull, 52; Northern Flicker, 1; Blue Jay, 1; Northern American Raven, 1; Eastern Crow, 580; Black-capped Chickadee, 11; White-breasted Nuthatch, 1; Red-breasted Nuthatch, 2; Eastern Golden-crowned Kinglet, 1; Northern Shrike, 1; Starling, 248; English Sparrow, 147; Bronzed Grackle, 1; Canadian Pine Grosbeak, 10; Eastern Goldfinch, 6; Slate-coloured Junco, 38; Eastern Tree Sparrow, 2. Total, 26 species; 1172 individuals.— R. W. Tufts, John Erskine and Roy Anderson.

WINDSOR, HANTS COUNTY, NOVA SCOTIA.— December 27th, 1944; 11.00 a.m. to 1.00 p.m. and 2.00 p.m. to 4.30 p.m. Sky clear; patches of crusted snow; light westerly wind; temp. 10° F. at start. Two observers together on foot, covering an area within approximately two miles of Windsor. Black Duck, 1; European Partridge, 21; Great Black-backed Gull, 2; Herring Gull, 24; Northern Hairy Woodpecker, 1; Blue Jay, 6; Northern American Raven, 2; Eastern Crow, 43; Black-capped Chickadee, 9; Acadian Chickadee, 14; Eastern Golden-crowned Kinglet, 6; Starling, 2; English Sparrow, 64; Slate-coloured Junco, 4; Eastern Song Sparrow, 2; Snow Bunting, 80 (estimated). Total 16 species, 281 individuals.— James C. Morrow and Robert S. Morrow.

QUEBEC, QUE.— (Levis suburbs, Fraser wood and golf course, Charlesbourg, along Shawinigan Power Transmission Line to Quebec Zoological Garden, Ste. Foy area; Cap Rouge and Quebec Bridge area, including St. Lawrence shore from Cap Rouge to Union Cove; Plains of Abraham, Spencer Wood, St. Patrick cemetery, Sillery, Bois Gomin airport, Bois Gomin Road and St. Louis Road; town suburbs 12%, fields 29%, coniferous forests 8%, deciduous woods 5%, mixed woodlands, 41%, shores

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1. —Received for publication March 7, 1945.

5%).— December 27, 1944; 8.15 a.m. to 4.30 p.m. Clear until noon, overcast p.m.; temp., -11° to 6° F.; wind N.W., 1-7 m.p.h.; 18-24 inches of snow on ground; small rivers mostly frozen over; large moving ice fields on St. Lawrence River. Four observers in four parties. Total hours, 23 on foot; total miles, 32 on foot. Ruffed Grouse, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 4; Downy Woodpecker, 1; Blue Jay, 1; Crow, 3; Black-capped Chickadee, 73; White-breasted Nuthatch, 2; Starling, 220; English Sparrow, 45; Evening Grosbeak, 10; Redpoll, 21; Snow Bunting, 50 (est.). Total, 13 species, about 432 individuals. (Seen in area Dec. 28,- Sharp-shinned Hawk, 1; Dec. 14,- Purple Finch, 1).— Mrs. G. Langelier, Louis A. Lord, Louis Lemieux, Raymond Cayouette. (La Société Zoologique de Quebec.)

MONTREAL, QUE.— (Mount Royal, La Salle Woods, Nun's Island, and South Shore from Caughnawaga to Longueuil).— December 17th, 1944. Snowing almost all day; wind W.S.W., 25 m.p.h.; visibility poor; temperature 20°-22° F.; snow depth 18 ins. 18 observers in 5 parties: total miles on ski 25, by boat 4, by automoble 95; total hours 32. Black Duck, 360; American Golden-eye, 25; American Merganser, 21; Sharp-shinned Hawk, 1; American Sparrow Hawk, 2; Ring-necked Pheasant, 75; Great Black-backed Gull, 3; Herring Gull, 311; Great Horned Owl, 1; Snowy Owl, 1; Hairy Woodpecker, 2; Downy Woodpecker, 9;Black-capped Chickadee, 41; White-breasted Nuthatch, 4; Brown Creeper, 11; Winter Wren, 1; American Robin, 3; Starling, 1600; English Sparrow, 500; Snow Bunting, 132. Total species, 20; total individuals, 3103 (partly estimated).— Province of Quebec Society for the Protection of Birds.

HUDSON HEIGHTS, QUE.— (west part of the village of Hudson adjoining Hudson Heights on the east, Hudson Heights, Whitlock Golf Club property and vicinity and Mr. N. M. Yuile's farm south side of Highway 17 about 1½ miles south of Como Station; mixed evergreen and deciduous woods 40%, second-growth and brush 20%, open farm land 10%, golf course open grass lands 10%, village gardens 20%). Jan. 7, 1945; dawn to 5 p.m. Dull; temp. -11° to -1° F., (-20° F. previous day); wind E breaking to N, 10-15 m.p.h.; bar. 30.15 to 30.00; snowing from noon, poor visibility, ground covered with 30 inches of snow, breakable crust; all water frozen; conditions very unfavourable. Eighteen observers in 4 parties. Total hours, 20½ (16½ on skis, 4 on foot; total miles, 20 (13 on skis, 7 on foot), Canada Ruffed Grouse, 3; Northern Pileated Woodpecker, 1 (Mrs. Puxley); Hairy Woodpecker, 3; Northern Downy Woodpecker, 4; Blue Jay, 47; Black-capped Chickadee, 40; White-breasted Nuthatch, 8; Starling, 8; English Sparrow, 84; Redpoll 12; Eastern Goldfinch, 1 (6 seen 2 days before); Eastern Tree Sparrow, 8; Eastern Song Sparrow, 2 (very unusual winter resident in Quebec province; identified during previous week, examined on count day at 4 yds. through x8 glass - G.G.O.); Snow Bunting, 25; Total 14 species; 246 individuals. Seen during the count period in area; American Three-toed Woodpecker (ladder-back clearly seen - Mrs. D. L. Macaulay), 1; Eastern Robin, 3 (inc. one previous day -16° F.).— Mrs. A. Bryan, Miss Amy Clarke, Jim F. Davis, B. A. Lancey, Mrs. D. L. Macaulay, Dunbar Mullan, John W. Mullan, Mr. and Mrs. Geof. Ommanney, Mrs. Graeme Pyke, Mr. and Mrs. George Riley, Mr. and Mrs. C. A. Seaton, Arthur Terreault, N. M. and W. S. Yuile.

OTTAWA, ONT. (radially about city).— December 24, 1944, dawn to dusk; low level fog, visibility 40 to 200 yards in morning, then clearing; 20 inches of snow; trees shrouded by heavy hoar frost; wind south, shifting slightly, 1 to 10 m.p.h.; temp. -7° F. at 8 a.m.; -1.5° F. at 10 a.m.; +15° F. at 2 p.m.; some open water near rapids; 19 observers in 11 parties; total party hours on foot 59, by car 4. Black Duck, 3; American Golden-eye, 40; American Merganser, 6; Sharp-shinned Hawk, 1; Sparrow Hawk, 2; Spruce Grouse, 2 (A. E. Porsild); Ruffed Grouse, 1; Ring-necked Pheasant, 56; Rock Dove, 59; Pileated Woodpecker, 1; Hairy Woodpecker, 7; Downy Woodpecker, 8; Arctic Three-toed Woodpecker, 1; Blue Jay, 11; Crow, 6; Black-capped Chickadee, 74; White-breasted Nuthatch, 24; Red-breasted Nuthatch, 2; Robin, 1; Northern Shrike, 3; Starling, 520; House Sparrow, 1358; Redpoll, 67; Pine Siskin, 19; American Goldfinch, 67; Tree Sparrow, 5; Snow Bunting, 98. Total 27 species, 2442 individuals.— Ottawa Field Naturalists' Club; R. M. Anderson, C. H. Bennett, E. Bourguignon, E. Brown, G. Cooch, R. E. DeLury, J. S. DeLury, J. A. Enstone, B. A. Fauvel, G. H. Hammond, T. S. Hennessy, O. H. Hewitt, Harrison F. Lewis, Elizabeth Lewis, Clarke R. Lewis, Hoyes Lloyd, A. E. Porsild, A. L. Rand, Stanley Rand.

PAKENHAM, LANARK CO., ONT.— December 27, 1944; 8.30 a.m. to 4.00 p.m.; Cloudy, light east wind; 20 inches of snow; temp. -6° to +10° F. Two observers in two parties, 12 miles on foot. American Golden-eye, 4; Rock Dove, 70; Blue Jay, 22; Black-capped Chickadee, 32; White-breasted Nuthatch, 5; Starling, 8; English Sparrow, 12; Snow Bunting (heard). Total, 8 species, 153 individuals. Seen December 24— Downy Woodpecker, 1; December 30— Evening Grosbeak, flock.— Edna G. Ross, Verna M. Ross.

COBOURG, ONT.— (Pratt's Pond N. E. to Baltimore; open farmland 55%, deciduous farm woodlots 10%, cedar woods 30%, cattail marsh 5%). December 27; 9 a.m. to 5 p.m. Overcast, with heavy snow from 3 p.m. on; temp 21° to 23° F.; wind S.E., 8-12 m.p.h.; ground covered with 12-18 inches of snow; pond completely frozen over, creek partly so. Total hours, 8 on foot; total miles, 8 on foot. Cooper's Hawk, 1; Ruffed Grouse, 3; Pheasant, 3; Downy Woodpecker, 1; Blue Jay, 1; Crow, 2; Black-capped Chickadee, 12; White-breasted Nuthatch, 2; Golden-crowned Kinglet, 1; Starling, 1; Goldfinch, 21; Slate-coloured Junco, 3; Tree Sparrow, 88. Total, 13 species; 139 individuals. (Seen in area December 24 — Meadowlark, 1.).— Alec Lucas.

RUTHERGLEN, ONT.— (24 miles east of North Bay to 10 miles west of Mattawa.) Area covered: settlement at C.P.R. Station of Rutherglen, Pimisi Bay, Kennedy Lake, settlement at C.P.R. Station of Eau Claire, Smith's Lake and Amable du Fond River. Open farmland 30%, coniferous farm woodlots 5%, second growth forest of mixed coniferous and deciduous trees, 65%. December 24, 1944. Clear to partly cloudy; temp -26° to +18° F.; wind W. veering to S.S.E., 2 to 5 m.p.h., ground covered with 13 inches of soft snow, trees heavily coated with hoarfrost which remained almost until the end of observations; all fresh water except rapids of Amable du Fond River frozen over. One observer; total hours, 7½ (partly by car, partly on foot), total miles, 15. American Golden-eye, 4; Hairy Woodpecker, 5; Canada Jay, 1; Blue Jay, 12; Black-capped Chickadee, 26; Red-breasted Nuthatch, 2; English Sparrow, 2. Total, 7 species, approximately 51 individuals. (Seen in area December 22— American Goshawk, 1).— Louise de Kiriline Lawrence.

PETERBOROUGH, ONT.— December 24, 1944; 10.30 a.m. to 5.00 p.m.; two observers in one party; Otonabee River to Nassau and Lily Lake; total miles, 16 by car, 7½ on foot; total hours, 6½; clear, cold; wind N.W., 3-5 m.p.h.; temp -3° to +10° F.; 20 inches of snow; heavy hoar frost in a.m. American Golden-eye, 37; American Merganser, 1; Ruffed Grouse, 1; Great Horned Owl, 1; Downy Woodpecker, 3; Blue Jay, 9; Black-capped Chickadee, 6; Golden-crowned Kinglet, 1; Starling, 3; English Sparrow, 20; American Goldfinch, 44; Tree Sparrow, 7. Total, 12 species, 133 individuals.— J. L. McKeever, R. L. Hale.

BARRIE, ONTARIO.— December 26, 1944. From town dock east three miles along shore and through adjacent woods; 10.00 a.m. to 5.00 p.m.; heavy snow fall continued until 4.00 p.m.; visibility poor; slight wind; 24 inches of snow on level; temp. 20° F.; 3 observers in one party. Common Loon, 2; Greater Scaup Duck, 36; White-winged Scoter, 3; Herring Gull, 50; Screech Owl, 1; Blue Jay, 5; White-breasted Nuthatch, 1; Robin, 1; Starling, 50; English Sparrow, 50; Pine Siskin, 16. Total, 13 species, 294 individuals. All local feeding stations report a marked scarcity of woodpeckers, chickadees and nuthatches. For the first time in several years, no Evening Grosbeaks have been reported so far this fall and winter.— Jim Gilmore, Ralph Knowles, E. L. Brereton.

NANCY LAKE FARM, KING TWP., YORK CO., ONT.— December 24, 1944; 2.30-5.30 p.m.. Light overcast, no wind or precipitation; about 12 inches of snow; temp. 25° F.; one observer, 4 miles on foot; 50% open field, 50% mixed bush. Ruffed Grouse, 6; Great Horned Owl, 3; Pileated Woodpecker, 1; Hairy Woodpecker, 1; Downy Woodpecker, 3; Blue Jay, 3; Black-capped Chickadee, 3; White-breasted Nuthatch, 4; Brown Creeper, 2; Starling, 12; American Goldfinch, 25; Slate-coloured Junco, 4; Tree Sparrow, 25; Song Sparrow, 1. Total 14 species, 98 individuals. On December 25— Sparrow Hawk, 1.— R. D. Ussher.

TORONTO, ONT.— December 24th, 1944; 8.15 a.m. to 5.30 p.m.; mostly fair; mean temp. 22° F.; about 20 inches of snow; 64 observers covering eight routes. Red-throated Loon, 1; Holboell's Grebe, 1; Great Blue Heron, 1; Mallard, 105; Black Duck, 788; Pintail, 8; Green-winged Teal, 1; Canvas-back, 3; Greater Scaup Duck, 3687; American Golden-eye, 288; Buffle-head, 12; Old-squaw, 1558; White-winged Scoter, 1; Surf Scoter, 1; American Scoter, 2; American Merganser, 67; Red-breasted Merganser, 4; Goshawk, 1; Cooper's Hawk, 2; Red-tailed Hawk, 13; Rough-legged Hawk, 4; Bald Eagle, 1; Marsh Hawk, 5; Sparrow Hawk, 22; Ruffed Grouse, 19; Common Pheasant, 565; Glaucous Gull, 1; Great Black-backed Gull, 32; Herring Gull, 2928; Ring-billed Gull, 26; Mourning Dove, 4; Screech Owl, 5; Great Horned Owl, 9; Barred Owl, 1; Long-eared Owl, 5; Short-eared Owl, 5; Belted Kingfisher, 2; Flicker, 2; Pileated Woodpecker, 4; Hairy Woodpecker, 29; Downy Woodpecker, 126; Horned Lark, 1; Blue Jay, 166; Crow, 45, Black-capped Chickadee, 291; White-breasted Nuthatch, 109; Brown Creeper, 28; Winter Wren, 2; Robin, 7; Golden-crowned Kinglet, 31; Cedar Waxwing, 54; Northern Shrike, 4; Starling, 2617; English Sparrow, 2255; Eastern Meadowlark, 1; Rusty Blackbird, 1; Cardinal, 93; Purple Finch, 79; Redpoll, 1; Pine Siskin, 156; Goldfinch, 734; Slate-coloured Junco, 477; Tree Sparrow, 506; White-throated Sparrow, 2; Song Sparrow, 51; Lapland Longspur, 2; Snow Bunting, 623. Total: 67 species, 18,675 Individuals.—Observers: J. L. Baillie, Jr., R. Bateman, D. Beacham, R. Bremner, C. H. D. Clarke, F. Cook, V. Crich, A, Cringan, J. Crosby, Mrs. Davies, C. Davies, R. Dingman, Y. Edwards, F. H. Emery, B. Falls, A. Gordon, D. Guthrie, H. Halliday, Paul Harrington, Peter Harrington, J. Holland, C. E. Hope, R. James, G. Lambert, R. Lanning, R. V. Lindsay, C. Long, J. MacArthur, J. W.MacArthur, R. MacArthur, D. MacDonald, T. F. McIlwraith, W. Mansell, R. Measham, R. Miller, M. Mitchell, D. Muir, T. Murray, H. Nickle, K. Nielsen, A. Outram, C. Proctor, T. Proctor, R. Ritchie, G. Roberts, R. Robinson, R. J. Rutter, J. Satterly, R. Saunders, D. Scovel, E. Shore, T. M. Shortt, Mrs. W. J. Sisman, D. Smith, F. Smith, W. W. Smith, L. L. Snyder, H. H. Southam, J. Speakman, S. L. Thompson, R. Trowern, R. D. Ussher, E. M. Walker, C. Wheeler. (the Brodie Club).

VINELAND, ONT.— (Lake front, experimental farm, 20 mile creek and marsh near Jordan Pond).— December 24, 1944; 9.15 a.m. to 1.30 p.m. Clear morning, becoming overcast at noon; wind slight; temp. 17° F. at 9.00 a.m.; 1 to 2 feet of snow; four observers in one party; total miles 15 (5 on foot, 10 by car). Black Duck, 1; Scaup Duck (sp.,) 1; American Golden-eye, 2; Rough-legged Hawk, 1; Ring-necked Pheasant, 1; Gull (sp.?), 2; Flicker, 2; Hairy Woodpecker, 3; Downy Woodpecker, 6; Blue Jay, 6; Crow, 2; Black-capped Chickadee, 2; White-breasted Nuthatch, 6; Brown Creeper, 1; Winter Wren, 1; Golden-crowned Kinglet, 3; Starling, 40; English Sparrow, 200+; Cardinal, 7; Goldfinch, 6; Slate-coloured Junco, 15 (approx.); Tree Sparrow, 200 (approx.); Song Sparrow, 1; Total 24 species, 631 individuals.— D. R. Clarke, R. F. Clarke, G. H. Dickson, W. E. Hurlburt.

HAMILTON, ONT.— (Dundas Valley west to Ancaster, Hamilton and Harbor, Beach, Stoney Creek, Burlington, Bronte, Aldershot, Lake Medad; mixed woodland and brush 41%, open farmland 20%, lakeshore 16%, city and suburbs 15%, pasture land 5%, marshes 3%). December 31; dawn to dark. Overcast, visibility 50-400 yards; temp. 30 to 35 F.; calm; ground covered with 18-24 inches of old snow and 2 inches of new snow; marshes and harbor frozen, lake open. Twenty-four observers in 14 parties and at 3 separate feeding stations. Total hours, 68; total miles, 100 on foot. Horned Grebe, 3; Great Blue Heron, 1; Black Duck, 40; Canvas-back, 3; Greater Scaup, 14; Lesser Scaup 7; American Golden-eye, 91; Buffle-head, 5; Old-sqaw, 14; White-winged Scoter, 1; Ruddy Duck (a female at 30 yards—J. A .C.), 1; Hooded Merganser, 2; American Merganser, 419 (est.); Red-breasted Merganser, 12; Cooper's Hawk, 5; Red-tailed Hawk, 5; Bald Eagle, 4; Marsh Hawk, 1; Sparrow Hawk, 2; Ruffed Grouse, 11; Pheasant, 62; Glaucous Gull, 4; Black-backed Gull, 68; Herring Gull, 4319 (est.); Ring-billed Gull, 4; Mourning Dove, 1; Screech Owl, 6; Great Horned Owl, 5; Flicker, 2; Yellow-bellied Sapsucker (G. O. McM.), 1; Hairy Woodpecker, 14; Downy Woodpecker, 63; Horned Lark, 19; Blue Jay, 46; Crow, 1; Black-capped Chickadee, 139; White-breasted Nuthatch, 35; Brown Creeper, 18; Winter Wren, 1; Robin, 2; Golden-crowned Kinglet, 22; Cedar Waxwing, 34; Starling, 1489 (est.); English Sparrow, 1848 (est.); Cardinal, 63; Purple Finch, 4; Goldfinch, 59; Slate-coloured Junco, 318; Tree Sparrow, 236; White-throated Sparrow, 1; Swamp Sparrow, 4; Song Sparrow, 31; Snow Bunting, 405. Total, 53 species; about 9965 individuals.— Eric W. Bastin, Clifford Boden, Donald, Janet, Neil, and Mr. and Mrs. R. D. F. Bourne, Miss M. E. Campbell, Mr. and Mrs. K. Cox, J. A. Crosby, Bruce Falls, A. B. Jackson, H. E. Kettle, Miss E. Malcolm, Jack Martin, G. O. McMillan, Miss E. Smith, Miss G. Nelson, George W. North, Mrs. H. C. Nunn, Miss L. Stewart, J. H. Williams, Miss L. Williams, (members Hamilton Nature Club).

MEAFORD, ONT.— (East half of town, and shoreline eastward two miles; 11th line N.; St. Vincent township).— December 26, 1944; 10.00 a.m. to 4.00 p.m.; temp. 18° F.; steady N.W. wind; bright; few clouds; two parties, five observers. American Merganser, 43+; Ruffed Grouse, 1; European Partridge, 3; Herring Gull, 300+; Rock Dove, 19+; Snowy Owl, 1; Downy Woodpecker, 3; Blue Jay, 3; Black-capped Chickadee, 2; White-breasted Nuthatch, 4; Starling, 96+; English Sparrow, 52+; Tree Sparrow, 5; Snow Bunting, 27. Total, 14 species, 559+ individuals. Seen December 25, 1944— Cooper's Hawk, 1; Flicker, 1.— L. H. Beamer, W. V. Brown (Meaford Natural History Club).

KITCHENER—WATERLOO, ONT.— December 26, 1944; 8 a.m. to 6 p.m. (E.D.T.). Sky changeable, alternately cloudy and clear at least four times, light snow falling with each overcast; foot of snow on ground, many drifts (2 to about 5 feet deep); wind northwesterly, moderate; temperature approximately 12-20-14° F. Five field parties, one going south (Parkway, etc., including Grand River mainly for waterfowl), second westward (Westmount woods), third motoring northwest (Baden-Nith River— negligible results), fourth northward (Bridgeport), fifth north and east (Bridgeport-Grand River-Breslau). Outing chiefly on foot, total over 60 miles (including vehicle travel), without aid of snowshoes or skis, hiking arduous. Just one party (Parkway) afield all day, though fifth active between 11 and 5. Mallard, 50; Black Duck, 160; Pintail, 2; American Golden-eye, 48; American Merganser, 46; Sharp-shinned Hawk, 1; Red-tailed Hawk, 1; Red-shouldered Hawk, 1; Ruffed Grouse, 1; Pheasant, 1; Herring Gull, 8; Great Horned Owl, 2; Hairy Woodpecker, 3; Downy Woodpecker, 14; Horned Lark, 2; Blue Jay, 27; Black-capped Chickadee, 180+; White-breasted Nuthatch, 13; Brown Creeper, 15; Robin, 1; Golden crowned Kinglet, 32; Starling, 125+; English Sparrow, 350+; Cardinal, 26; Purple Finch, 11; Pine Siskin, 1; American Goldfinch, 90; Junco, 73; Tree Sparrow, 56; Swamp Sparrow, 2 (first winter record); Song Sparrow, 8; Snow Bunting, 35. Total, 32 species, 1385+ individuals. December 22; 1 Cooper's Hawk: 1 Brown Thrasher (first winter; close views; absent on December 26). —W. Bergey, R. Bowman, F. W. R. Dickson, Dwight Engel, Daniel Heinrich, J. Hough, Robert Hough, G. W. Knechtel (Census director), Dorothy Koch, F. H. Montgomery, K. Moon, Astrid Neilsson, Donald Russell, A. Shantz, F. A. Shantz.

LONDON, ONT.— (Thames River Valley to a point about 10 miles west of the city).— December 26; 9.00 a.m. to 5.00 p.m. temp. 16° F. at start; sky overcast at first then clearing several hours later; 14 in. snow, wind from west, approx. 15 m.p.h. Thirty-four observers in 9 parties. Total hours afield 27; (22 on foot, 5 by car). American Golden-eye, 44; American Merganser, 129; Sharp-shinned Hawk, 2; Cooper's Hawk, 2; Red-tailed Hawk, 7; Red-shouldered Hawk, 1; Rough-legged Hawk, 3; Bald Eagle, 2; Marsh Hawk, 2; Sparrow Hawk, 1; Common Pheasant, 12; Herring Gull, 28; Mourning Dove, 1; Great Horned Owl, 2; American Long-eared Owl, 3; Short-eared Owl, 1; Belted Kingfisher, 2; Hairy Woodpecker, 1; Downy Woodpecker, 22; Arctic Three-toed Woodpecker, 1; Blue Jay, 22; Crow, 2; Black-capped Chickadee, 108; White-breasted Nuthatch, 19; Brown Creeper, 4; Winter Wren, 1; Golden-crowned Kinglet, 8; Cedar Waxwing, 12; Starling, 200; English Sparrow, 150; Cardinal, 54; Purple Finch, 7; American Goldfinch, 16; Song Sparrow, 4; Slate-coloured Junco, 149; Tree Sparrow, 85; Snow Bunting, 200. Total 37 species; 1,316 individuals. Seen December 27.- Cowbird, 1.— W. J. Abbott, Bill Baldwin, Harold Calvert, Barry Camp, Ron Crawley, Don Cooper, Mrs. E.M.S. Dale, Kathleen Fetherston, Ted Garside, Francis Girling, Jean Glacier, Mr. and Mrs. Hoffman, Keith Horton, John Kormos, Alan Loughrey (sec'y), Hugh B. MacMahon, Mrs. Marshall, Keith Reynolds, G. Roberson, Ted Roberts, Stanley Robinson, A. Shipley, George Skinner, Harold Skinner, Harry Stevens, Mr. and Mrs. Stewart, Sandy Stewart, Charles Whitelaw, Langford Williams, Ronnie Williams, Mrs. R. L. Williams, Bill Wood (MacIlwraith Ornithological Club).

CHATHAM, ONT.— December 28, 1944. 8.30 a.m. to 5.30 p.m. Clear; wind moderate W. to N.W.; temperature at start, 15° F.; 15 to 18 inches of snow on the level, with drifts three to four feet along fence rows and edges of woods. Visibility good. Five cars were out, two cars with four observers, two with two observers and one, with one observer. Six other persons took notes around their homes. Many of the choice habitats could not be reached; all roads to the various marshes were blocked. The survey was taken mainly along Highways 3 and 4, within a distance of 15 miles from Chatham. Great Blue Heron, 1; Black-crowned Night Heron, 3 (B. F. B.) Mallard, 176; Black Duck, 350; Gadwall, 2; Greater Scaup, 15;

Lesser Scaup, 3; American Golden-eye, 25; American Merganser, 12; Red-breasted Merganser, 17; Sharp-shinned Hawk, 2; Cooper's Hawk, 1; Red-tailed Hawk, 9; Red-shouldered Hawk, 2; Rough-legged Hawk, 6; Bald Eagle, 1; Marsh Hawk, 9; Sparrow Hawk, 1; Bob-White, 1; Common Pheasant, 12; Herring Gull, 125; Bonaparte's Gull, 25; Rock Dove, 98; Mourning Dove, 26; Screech Owl, 3; Great Horned Owl, 2; American Long-eared Owl, 2; Short-eared Owl, 1; Belted Kingfisher, 2; Hairy Woodpecker, 4; Downy Woodpecker, 37; Horned Lark, 25; Blue Jay, 39; Crow, 842+; Black-capped Chickadee, 10; White-breasted Nuthatch, 17; Brown Creeper, 13; Golden-crowned Kinglet, 29; Cedar Waxwing, 10; Starling, 276+; English Sparrow 1095+; Cowbird, 17; Cardinal, 54; Pine Siskin, 9; American Goldfinch, 7; Red-eyed Towhee, 6; Slate-coloured Junco, 162; Tree Sparrow, 266+; Chipping Sparrow, 2 (L.J.B., D.H.Y., C.H.H., C.M.A.); Swamp Sparrow, 1; Song Sparrow, 15; Lapland Longspur, 1; Snow Bunting, 28. Total, 53 species, 3897 individuals.— C. M. Anderson, D. A. Arnott, Melba Bates, L. J. Bohn, B. F. Bradley, H. English, W. M. Gray, C. H. Hand, F. Jordan, G. McGarvin, J. O. Moore, M. E. Morgan, G. M. Stirrett, A. A. Wood, Mary Wood, H. B. Wressell, D. H. Young, C. H. Zavitz, Perry Zavitz (members of Kent Nature Club and others).

SARNIA, ONT.— December 26, 1944; 10.30 a.m. to 12 noon, 2.00 p.m. to 5.15 p.m.; clear; 14 inches of snow; strong westerly wind, temp. 4° F. to 14° F. Whistling Swan, 1; Black Duck, 40; American Golden-eye, 300+; Lesser Scaup Duck, 100+; American Merganser, 200+; Red-breasted Merganser, 106; Hooded Merganser, 12; Bob-white, 22; Pheasant, 41; Herring Gull, 200+; Mourning Dove, 32; Hairy Woodpecker, 3; Downy Woodpecker, 2; Crow, 10; Black-capped Chickadee, 9; White-breasted Nuthatch, 3; Brown Creeper, 3; Golden-crowned Kinglet, 1; Starling, 61; English Sparrow, 1000+; Cardinal, 7; Slate-coloured Junco, 22; Tree Sparrow, 84. —Total 23 species, 2258 individuals.

SAULT STE. MARIE, ONTARIO.— December 30, 1944; 9.30 a.m. to 4.30 p.m.; Sault Ste. Marie to within 3 miles of Pt. aux Pins by car, from there to Pt. aux Pins on skis, and return; Wireless Hill, just north of Sault Ste. Marie at east end; Paper company tail race at river. Six observers in two parties. Total party hours, by car - 2; on foot - (skis and snowshoes) - 6½. Total miles: by car - 20; on foot (skis and snowshoes) - 11. Temperature most of day approximately 32°F. Fine rain in morning; cloudy and dull all day; light southeast wind. American Golden-eye, 5; American Merganser, 27; Ruffed Grouse, 1; Herring Gull, 25; Hairy Woodpecker, 1; Downy Woodpecker, 4; Canada Jay, 2; Blue Jay, 9; Crow, 1; Black-capped Chickadee, 50; Red-breasted Nuthatch, 5; Brown Creeper, 5; Starling, 107; English Sparrow, 112; Redpoll, 67; Pine Siskin, 6; Goldfinch, 14. Total, 17 species, 441 individuals. The following additional species have been seen recently, but were missed on the census: December 14- Pine Grosbeak, 1; December 16 -Evening Grosbeak, 6; December 28 - Snow Bunting, 30. —J. E. Brown, N. R. Brown, J. E. MacDonald, J. R. MacDonald, D. A. Ross, E. A. Ross.

YORKTON, SASK. — (area 15 miles in diameter with Yorkton as centre). Dec. 26; 10.00 a.m. to 5.00 p.m. Clear bright day, cloudy in late afternoon; wind NW, about 8 mph; only slight sprinkling of snow on fields. Temp., -8°F. at start, 6°F. at finish. 12 observers in 6 groups. Total party hours afield, 10 (5 by car and 5 on foot); total party miles, 53½ (47 by car and 6½ on foot). Goshawk, 1; Ruffed Grouse, 2; Sharp-tailed Grouse, 39; Hairy Woodpecker, 2; Downy Woodpecker, 1; Blue Jay, 1; American Magpie, 3; Black-capped Chickadee, 17; Bohemian Waxwing, 39; English Sparrow, 525 (est.); Snow Bunting, 877 (est.). Total 11 species, approximately 1507 individuals. One dead Hungarian Partridge found on road during census. Snowy Owl noted Dec. 25; Great Horned Owl, Dec. 28; Pine Grosbeak, Dec. 28; American Robin seen at close range by three observers, Dec. 27 and 28.— Ray Adam, Vernon Barnes, Neil Black, Jack Brownlee, W. A. Brownlee, Brother Clarence, C. Stuart Houston, Dr. S. C. Houston, Mrs. J. Meekma, Michael Priestly, Mrs. I. M. Priestly, C. C. Shaw (members Yorkton Natural History Society).

CAMROSE, ALTA.— December 23, 1944; 12 noon to 4.00 p.m.; by auto to Battle River bridge at old Duhamel, through spruce woods on foot; by auto on south river road to Breland Bridge, and return to Camrose.— 20 miles; overcast, occasional flurries of snow; strong N.W. wind; 3 inches of snow; temp. 18° F. Mallard, 1; Goshawk, 1; Rough-legged Hawk, 1; Great Horned Owl, 1; Downy Woodpecker, 1; Blue Jay, 1; American Magpie, 10; Black-capped Chickadee, 25; Red-breasted Nuthatch, 1; White-winged Crossbill, 15; Redpoll, 25. Total, 11 species, 82 (approx.) individuals. Thousands of mallards in fields during the last few days.— F. L. Farley, Calvin and Gordon Waterston.

OKANAGAN LANDING, VERNON, B.C.— December 21, 1944; 8.00 a.m. to 3.00 p.m. standard time. Cloudy in forenoon; sunshine from 12.30 p.m.; light north wind; temp. 24° F., 8.00 a.m., 28° F., 3.30 p.m.; trace of snow on ground in valleys. One observer in Coldstream District, 5 miles on foot; 27 species, 386 individuals. Two observers together, Okanagan Landing to Swan Lake, 25 miles by car, 5 miles on foot; 48 species, 2422± individuals. Horned Grebe, 2; Mallard, 222±; Gadwall, 2; Pintail, 5; Baldpate, 325±; Green-winged Teal, 3; Shoveller, 100; Ring-necked Duck, 10; Redhead, 50±; Canvas back, 2; Greater Scaup Duck, 90±; American Golden-eye, 158±; Barrow Golden-eye, 1; Buffle-head, 204±; White-winged Scoter, 1; American Merganser, 1; Goshawk, 4; Rough-legged Hawk (?), 1; European Partridge, 12; California Quail, 50±; Ring-necked Pheasant, 115; American Coot, 400±; Killdeer, 1; Wilson Snipe, 9; Red-backed Sandpiper, 6; Herring Gull, 2; Horned Owl, 1; Belted Kingfisher, 1; Red-shafted Flicker, 19; Pileated Woodpecker, 2; Downy Woodpecker, 2; Steller Jay, 2; American Magpie, 14; American Raven, 6; Crow, 300±; Clarke Nutcracker, 3; Black-capped Chickadee, 19; Red-breasted Nuthatch, 4; Dipper, 2; Winter Wren, 1; American Robin, 8; Western Bluebird, 9; Townsend Solitaire, 1; Ruby-crowned Kinglet, 4; Bohemian Waxwing, 50; Northern Shrike, 2; English Sparrow, 26; Red-winged Blackbird, 20; Brewer Blackbird, 40; Evening Grosbeak, 250; Cassin Purple Finch 10; Redpoll, 6; American Goldfinch, 16; Red Crossbill, 3; Oregon Junco, 198; Tree Sparrow, 1; Harris Sparrow, 1; Song Sparrow, 12. 56 species, 2809± individuals. A. C. Mackie, A. O. Munro, J. A. Munro.

SUMMERLAND, B. C.— December 23, 1944. Dull, with fog over valley; wind west in morning; slight snow; temp. 16-22°F.; ground bare. Observers separate, covering 3 miles of lakefront, back over adjoining fruit benches. Loon, 1; Horned Grebe, 1; Pied-billed Grebe, 1; Mallard, 13; Gadwall, 5; Baldpate, 25; Green-winged Teal, 6; Redhead, 200; Canvas-back, 9; American Golden-eye, 2; Bufflehead, 3; American Merganser, 2; California Quail, 50; Pheasant, 6; American Coot, 250; Killdeer, 5; Great Horned Owl, 1; Saw-whet Owl, 1; Flicker, 31; Hairy Woodpecker, 4; American Magpie, 46; Long-tailed Chickadee, 16; Mountain Chickadee, 9; Red-breasted Nuthatch, 22; Pygmy Nuthatch, 18; Dipper, 1; Robin, 1; Western Bluebird, 47; Bohemian Waxwing, 150; Northwestern Shrike, 2; English Sparrow, 125; Meadowlark, 18; Red-winged Blackbird, 2; Goldfinch, 70; Junco, 690; Tree Sparrow, 25; Gambel's Sparrow, 3; Song Sparrow, 76. Total, 38 species, 1937 individuals.— Eric M. Tait and Herbert Simpson.

NEW WESTMINSTER, B.C.— December 31, 1944. Along section of North Arm, Fraser River; largely open bush of alders, cottonwoods and willows, with some cedars and firs; pastured fields along the river; 5 miles on foot, 6 by car; 11.00 a.m. to 3.30 p.m.; dull; temp. 40° F.; raw wind with occasional showers; visibility restricted. Northwest Coast Heron, 3; Mallard, 3; American Merganser, 1; Western Red-tailed Hawk, 1; Sharp-shinned Hawk, 1; Oregon Ruffed Grouse, 1; Ring-necked Pheasant, 3; Glaucous-winged Gull, 4+; Herring Gull, 1; Short-eared Owl, 1; Northwestern Flicker, 1; Harris's Woodpecker, 1; Pileated Woodpecker, 1; Northwestern Crow, 8; Oregon Chickadee, 28; Coast Bush Tit, 21; Seattle Wren, 2; Western Winter Wren, 6; Northwestern Robin, 1; Pacific Varied Thrush, 22; Northwestern Red-wing, 2; English Sparrow, 3; Oregon Junco, 54; Oregon Towhee, 3. Total, 26 species, 205 individuals.— Bruce Krug, Harry Middleton, W. S. Maguire.

CRESCENT B.C. (Bushland and coastline between Ocean Park and Crescent on foot. Estuary of Nicomekl River by rowboat).— December 28th, 1944; 9 a.m. to 4.30 p.m. P.D.T. Overcast with occasional sunshine. Moderate southwest wind; temp. 42° at sunrise. Two observers together. Common Loon, 6; Holboell's Grebe, 2; Horned Grebe, 13; Western Grebe, 2; White-crested Cormorant, 3; Northwest Coast Heron, 6; Black Brant, 500+; Mallard Duck, 60; Baldpate, 1; Pintail, 50; Green-winged Teal 200+; Canvas-back, 30; Greater Scaup Duck, 65; American Golden-eye, 50; Buffle-head, 60; Harlequin Duck, 4; White-winged Scoter, 75+; Surf Scoter 55+; American Scoter, 22; Ruddy Duck, 4; Red-breasted Merganser 7; Sparrow Hawk, 1; Ring-necked Pheasant, 2; Oregon Ruffed Grouse, 2; American Coot, 2; Black Turnstone, 1; Glaucous-winged Gull, 20; Thayer's Gull (?), 1; Short-billed Gull, 3; Short-eared Owl, 2; Belted Kingfisher, 1; Northwestern Red-shafted Flicker, 5; Gairdner's Woodpecker, 2; Northwestern Crow, 52; Oregon Chickadee, 10; Winter Wren, 2; Northwestern Robin, 3; Golden-crowned Kinglet, 1; Sitka Kinglet, 2; California Purple Finch, 13; Pine Siskin, 10; Oregon Towhee, 2; Oregon Junco, 2; Rusty Song Sparrow, 14. Total, 44 species, 1468+ individuals. Also California Murre, 1 (Dead bird); Flock of Ducks 2000+, (probably Pintail); December 8th, Coast Bush Tit, 8; December 14th, Northwestern Shrike, 1; December 25th, Cedar Waxwing, 1; December 30th, Varied Thrush, 1; large increase in River and Pond Ducks in recent years.— Martin W. Holdom, William T. Plaxton.

COURTENAY-COMOX, VANCOUVER ISLAND, B.C.— One mile west of town, through town, river bank, estuary and sea shore, and adjoining cultivated land. December 30, 1944; 9 a.m. to 4.30 p.m.; dull with high fog, poor visibility, calm; temp. 30 to 38° F.; previous week mild. Two observers together, 10 miles on foot. Lesser Loon, 8; Holboell's Grebe, 3; Horned Grebe, 5; Western Grebe, 7; Double-crested Cormorant, 4; North-west Coast Heron, 3; Mallard, 150+; Baldpate, 100+; Green-winged Teal, 1; Canvas-back, 7; Greater Scaup, 250; American Golden-eye, 100; Barrow's Golden-eye, 3; Buffle-head, 50; White winged Scoter, 500; Surf Scoter, 100; Hooded Merganser, 7; American Merganser, 55; Red-breasted Merganser, 6; Sharp-shinned Hawk, 2; Red-tailed Hawk, 1; Black Pigeon Hawk, 1; Pheasant, 10; American Coot, 26; Killdeer, 4; Wilson's Snipe, 4; Glaucous-winged Gull, 250; Herring Gull, 1; Thayer's Gull (?), 1; Short-billed Gull, 3; Western Belted Kingfisher, 3; Northwestern Red-shafted Flicker, 8; Western Pileated Woodpecker, 1; Harris' Woodpecker, 4; Gairdner's Woodpecker, 2; Stellar's Jay, 3; Northern Raven, 3; Western Crow, 4; Northwestern Crow, 400; Oregon Chickadee, 13; Western Winter Wren, 11; Western Robin, 26; Pacific Varied Thrush, 16; Western Golden-crowned Kinglet, 11; Northwestern Shrike, 1; English Sparrow, 65; Western Meadowlark, 10; Brewer's Blackbird, 82; California Purple Finch, 8; Oregon Towhee, 15; Oregon Junco, 104; Rusty Song Sparrow, 16; also 6,000 ducks, probably mostly the two afore-mentioned scoters; noted in previous 24 hours - Bald Eagle, 1; Red-backed Sandpiper, 1; Pine Siskin, 1. Total 51 species, 8476 individuals. —Theed Pearse, A. R. Davidson.

## CURRENT LITERATURE

RHYNCHOSPORA, SECTION EURHYNCHOSPORA, IN CANADA, THE UNITED STATES AND THE WEST INDIES. *By Shirley Gale. Rhodora. Vol. 46, No. 544, pp. 89-134; No. 545, pp. 159-197; No. 546, pp. 207-249; No. 547, pp. 255-278. April, May, June, and July, 1944.*

This monograph includes the following references to Canadian species: *R. capitellata* in N.B. and Ont.; *R. alba* in Que., Sask., B.C. and Alaska; *R. alba* forma *laeviseta* is a new form, the type of which is from Nfdl., but which is also found in Canada in Que., N.S. and B.C.; *R. capillacea* in Nfdl., Quebec, N.B., Sask.; *R. fusca* in Nfdl., N.B. and N.S.

— HAROLD *A*. SENN

THE SONG OF THE WOOD PEWEE *Myiochanes virens* LINNAEUS: *A study of bird music by Wallace Craig, New York State Mus. Bull., No. 334, pp. 1-186, pl. 1, 1943.*

An extended study of bird song as music, including such topics as: The morning twilight song; other songs and calls; geographical variation and individual differences; musical life history; comparison with other species; evolution of the song; imitation; birds song as aesthetic art; ranking the song birds and problems for future study. There is a five-page bibliography. It is an unusual and exceptionally interesting paper.— A. L. RAND.

# STATEMENT OF FINANCIAL STANDING
# OTTAWA FIELD-NATURALISTS' CLUB, DECEMBER 1, 1944

## CURRENT ACCOUNT

| ASSETS | | *LIABILITIES* | |
|---|---|---|---|
| Balance in Bank, Dec. 1, 1944 | 518.11 | Reserve Fund | 3.00 |
| Bills Receivable | 38.50 | Balance | 553.61 |
| | 556.61 | | 556.61 |

| RECEIPTS | | *EXPENDITURES* | |
|---|---|---|---|
| Balance in Bank, Dec. 2, 1943 | 375.54 | Canadian Field-Naturalist | 621.95 |
| Fees:- | | Editor | 70.00 |
| Current | 688.48 | Separates and Illustrations | 286.89 |
| Advances and Arrears | 134.30 | Postage and Stationery | 119.37 |
| Separates and Illustrations | 420.27 | Excursions Committee | 35.00 |
| Single and Back Numbers | 34.60 | Reserve Fund | 15.02 |
| Miscellaneous | 40.32 | Bank Discount | 17.80 |
| | | Miscellaneous | 9.37 |
| | | Balance in Bank, Dec. 1, 1944 | 518.11 |
| | 1693.51 | | 1693.51 |

## *RESERVE FUND*

| ASSETS | | LIABILITIES | |
|---|---|---|---|
| Canadian Government Bonds | 1500.00 | Nil | |
| Balance in Bank, Dec. 1, 1944 | 200.26 | | |
| | 1700.26 | | |

| *RECEIPTS* | | EXPENDITURES | |
|---|---|---|---|
| Balance in Bank, Dec. 2, 1943 | 123.33 | Rent, Safety Deposit Box | 3.00 |
| Current Account | 15.02 | | |
| Bond Interest | 63.00 | | |
| Bank Interest | 1.91 | Balance in Bank, Dec. 1, 1944 | 200.26 |
| | 203.26 | | 203.26 |

## *PUBLICATION FUND*

| ASSETS | | LIABILITIES | |
|---|---|---|---|
| Canadian Government Bonds | 1000.00 | Nil | |
| Balance in Bank, Dec. 1, 1944 | 203.52 | | |
| | 1203.52 | | |

| *RECEIPTS* | | EXPENDITURES | |
|---|---|---|---|
| Balance in Bank, Dec. 2, 1943 | 160.19 | Nil | |
| Bond Interest | 42.50 | | |
| Bank Interest | .83 | Balance in Bank, Dec. 1, 1944 | 203.52 |
| | 203.52 | | 203.52 |

*Audited and found correct*
Harrison F. Lewis
W. H. Lancely
*AUDITORS*

Dec. 2, 1944
I. L. Conners,
*Treasurer.*

# SIXTY-SIXTH ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB

## REPORT OF COUNCIL

MEETINGS. — During 1944 three meetings of Council were held as follows; January 22 with 17 members present, March 30 with 15 members present, and October 26, with 13 members present.

At the March meeting changes in the By-laws were adopted which have been published in The Canadian Field-Naturalist 58: 51. 1944.

At the October meeting Mr. P.A. Taverner was elected an Honorary Member of the Club, and Dr. H. M. Raup and Mr. E. A. Preble were elected Corresponding Members.

### EXCURSIONS AND LECTURES COMMITTEE

During 1944 the Committee arranged six monthly lectures, three special meetings, eight Saturday afternoon excursions, one all day excursion, and a picnic.

Lectures:

Jan. 20 — The sound-colour film Combat was shown, introduced by Dr. L. T. Richardson and Mr. D. A. Ross.

Feb. 17 — Insects in Poetry and Drama by Dr. C. R. Twinn.

Mar. 16 — Ferns of Ontario by Lt.-Comm. T. M. C. Taylor.

Apr. 20 — Greenland by Mr. A. E. Porsild, illustrated by his kodachrome slides.

Oct. 19 — Geology To-day by Dr. F. J. Alcock, illustrated by two movies on Volcanoes and Soil Erosion.

Nov. 16 — The importance of Insects in Natural History by Mr. H. L. Seamans.

Special meetings:

Mar. 4 — Dr. Arkle of Toronto gave an illustrated address on "A Dentist among the James Bay Indians.

April 27 — Dr. A. L. Rand and Dr. C. H. D. Clarke reviewed the birds likely to be seen on the spring excursions. Recordings of bird songs were played and movie "Birds of an Ottawa Garden" was shown.

May 4 — Mr. H. Groh, Dr. W. H. Minshall, and Mr. M. N. Zinck took charge of a meeting to review the spring flowers. Mr. F. R. Crawley's movie of early spring flowers was shown.

Excursions:

May 6 — Britannia

May 20 — Wychwood

May 27 — Notre Dame Cemetery, Eastview, to MacKay Lake.

June 10 — to the lower Gatineau region west of Wrightville.

June 17 — to the Ottawa River in Ottawa West.

Sept. 16 — to gather milkweed at Gatineau Point.

Sept. 23 — to the Ottawa River near the Champlain Bridge.

Sept. 30 — Eastview quarries

Aug. 20 — all day excursion to Burnet, Que, where the Club members and their friends were the guests of Miss Audrey Witty and her parents.

On July 20 a picnic was held at the Experimental Farm. Supper was held in the Farm Cafeteria due to bad weather and Mr. M. B. Davis spoke on the work of the Farm and especially of the Division of Horticulture and conducted a tour of the horticultural greenhouses and gardens and dehydration laboratories.

There were 38 Excursion Ticket Holders this year as compared with 27 last year. Financial receipts were $60.65 and expenditures $53.28, leaving a balance of $7.37.

PUBLICATIONS COMMITTEE. — The Committee has continued to publish the Canadian Field-Naturalist although the numbers have been late in appearing. A change of policy in issuing the magazine has been adopted. Beginning with Vol. 58, it will be issued in six numbers per year instead of nine numbers as formerly. Each number is to have a minimum of 24 pages and the total number of pages per volume will not be reduced.

BIRD CENSUS COMMITTEE. — The Christmas bird census report was published in the July-August number of the Canadian Field-Naturalist. The census was taken on Dec. 26, 1943 and a total of 22 species and 1,556 individuals was reported.

ACKNOWLEDGEMENTS. — The Council of 1944 wishes to take this opportunity of expressing its gratitude to those speakers who have addressed the Club; to those who have provided slides and movies; to those who have provided rooms and equipment; to those who have assisted at excursions; to Station CKCO for radio announcements: to the Ottawa Citizen and Ottawa Journal for press reports; to Mr. W. M. Croskery, Agricultural Representative, for the use of his office for meetings of Council, and to Miss Audrey Witty and her parents whose hospitality made possible the all day excursion.

— J. WALTON GROVES, SECRETARY.

# BOOK REVIEWS

SNOWSHOE COUNTRY. *By Florence Page Jaques: University of Minnesota Press, Minneapolis 1944; pp. 110 with numerous illustrations by Francis Lee Jaques, $3.00*

Written from the literary rather than the scientific standpoint, "Snowshoe Country" is a delightfully intimate narrative of the border country between Minnesota and Canada. It depicts the land of the Jaques' former book, "Canoe Country" in winter plumage. Through this country the Jaques travelled by moccasin, snowshoe, and dog team, across frozen lakes and through cedar swamps, tall spruce stands and mighty pine forests.

The value of the book is greatly enhanced by numerous black-and-white drawings by the author's husband, the well-known nature-artist. These charming illustrations vividly portray the nature of the country, both geographical and zoological. Under his skillfull touch the winter beauty of the Gunflint leaps to life.

Author and illustrator have effectively combined their talents to produce a most unusual book, a book which amuses, informs and fascinates the reader all at the same time.—K. E. FETHERSTON.

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THE REPTILES OF BRITISH COLUMBIA. *By G. Clifford Carl, British Columbia Provincial Museum, Victoria, B.C., 1944, pp. 60, illustrated, 25 cents.*

A companion to The Amphibians of British Columbia, this pocket size handbook deals with the structure and colour, distribution, habits and habitat of the twelve species and several subspecies of lizards, snakes and turtles found in British Columbia. Sections of the book are devoted to means of defence, myths and popular beliefs and economic importance.

The eighteen splendid illustrations were prepared by Frank L. Beebe. The snake drawings are unusually successful, as these winding creatures test an artist's skill.

To anyone the least bit interested in the natural history of western Canada, The Reptiles of British Columbia is worth far more than the sale price.— C. L. PATCH.

# NEWS OF NATURALISTS

Working under the Fisheries Research Board of Canada, V. C. Wynne-Edwards and R. Grant last summer made a preliminary survey of the distribution of fish and fisheries in the Mackenzie river, from Great Slave Lake to the Delta. The party descended the river by freighter canoe and returned by plane. The survey was also carried to Great Bear Lake and to the Mackenzie Mountains via the Canol Road. A number of fish new to the Northwest Territories were collected. A second and larger party, under Dr. D. S. Rawson, undertook more extensive studies in Great Slave Lake.

Mr. Edward A. Preble of Washington, D.C. was elected a corresponding member of the Ottawa Field Naturalists' Club in recognition of his important pioneer work in natural history in Canada.

Mr. Preble has travelled widely in northern and western Canada, and two of his reports, based on his travels, stand as classics: "A Biological Investigation of the Hudson Bay Region", published in 1902, and " A Biological Investigation of the Athabaska-Mackenzie Region", published in 1908.

Mr. P. A. Taverner has been elected an honorary member of the Ottawa Field-Naturalists' Club in recognition of his outstanding ornithological work, and service in the interest of the Club.

With field experience in Canada from the Atlantic to the Pacific oceans, and from the Arctic to Point Pelee, Mr. Taverner has produced many scientific papers on the birds of Canada while ornithologist with the National Museum of Canada. But probably he is best known to the members of the Club as author of the monumental "Birds of Canada," and as long time ornithological editor of this publication.

Since his retirement (*See* Can. Field-Nat. 56, p. 127, 1942) he has been devoting his time to the preparation of an elaborate work on the game and water birds of northern North America.

The latest news of the British Museum (Natural History) in the Museum's Journal for January, 1945, p. 159, states that flying bombs in July 1944 caused considerable damage to doors, windows, skylights and roofs. Little damage was done to the mammals; the cabinets in the Bird Room suffered severely and much damage was done to the entomological material. Only a few geological specimens were destroyed, but many of the specimens remaining in the Fossil Mammal Gallery were injured. Percolating rain water caused further damage.

The studies of the Director and Keepers were damaged, and several staff members received cuts from broken glass.

Temporary repairs are being made on the buildings.

A biological study of the ruffed grouse is being carried on by Lionel Philippe of the University of Montreal.

Last year an appeal was made to hunters to co-operate, and send in specimens and information from their areas. During the past year M. Philippe received about 70 specimens from southern Quebec for study. This coming year he hopes to extend these activities. He is interested in securing information as to the local presence of birds and their survival during the winter. Any dead grouse found will be useful for examination. They should be simply wrapped in wax paper sprinkled with table salt, with an outer cover of hard paper, and addressed to Lionel Philippe, Institut de Biologie, Université de Montreal, 2900 Blvd. Mont-Royal, Montreal. P.Q. A first report on his investigations is promised at an early date.

Dr. Hugh Miller Raup, Assistant Professor of Plant Ecology, Harvard University, was elected a corresponding member of the Ottawa Field-Naturalists' Club at a Council meeting held in October, 1944.

Dr. Raup is well known in Canada for outstanding phytogeographical and ecological studies of the flora of the upper Mackenzie drainage basin.

# NOTES AND OBSERVATIONS

**NESTING OF WESTERN BLUEBIRD.** — In the *Canadian Field-Naturalist*, February, 1939, reference was made to the nesting of western bluebirds and violet green swallows on a ranch near Huntingdon B.C. The bluebirds failed to put in an appearance in 1942, but nested in 1943, and again during the current year 1944. The bluebirds took possession of the nesting box at the westerly side of the house, and the violet green swallows the box at the westerly end of the garage.

Each pair of birds reared their first brood successfully, and then to our surprise, amicably exchanged nesting boxes for the second broods. Two weeks before the second brood of bluebirds left their nesting box in early July, a second pair of adult bluebirds joined forces with the nesting birds, and together they fed the young until fledged.

When cleaning out the nesting boxes, the one on the house contained one infertile bluebird egg, and a dead and dried-up young violet green swallow. —KENNETH RACEY, VANCOUVER, B.C.

**THE SMALL PURPLE FRINGED ORCHID NEAR FORT WILLIAM, ONTARIO.**— On August 2nd, 1942, I located a small station of the Small Purple Fringed Orchid (*Habenaria psycodes* (*L.*) Sw.), on the Canadian side of the International Boundary, at Pigeon (High) Falls, on the Pigeon River. Pigeon Falls is in Pardee Township, District of Thunder Bay, approximately 30 miles south-west of Fort William. Only three plants were in bloom, one of which was collected. The plants were growing in a small boggy area immediately adjacent to a roadway and parking space. It is conceivable they are the remains of a larger colony, partially destroyed when a nearby tourist stand was built, and the surviving plants will soon perish as the area is further developed.

Morris and Eames (*Our Wild Orchids*, p. 158, 1929) give the range of *Habenaria psycodes* as "Newfoundland and New England in east, south to North Carolina, west to Minnesota and Illinois." These, and other authors, seem to have overlooked old records in their recent references to the distribution of the Small Purple Fringed Orchid. Macoun (*Catalogue of Canadian Plants, Part IV*, pp. 19-20, 1888) referred to a station 15 miles up the Kaministiquia River, 25 miles north of the one recorded above, and another at Rainy River much farther west. Unfortunately I have not been able to ascertain whether these old stations still exist.

Unfortunately, *Habenaria psycodes* is not the only local orchid suffering from the encroachments of civilization. What was once the only local station for the Ram's Head Lady's Slipper (*Cypripedium arietinum R. Br.*)[1] is now a site for tourist cabins, a mile outside the city limits of Port Arthur and Fort William. Similarly, where we found Showy Lady's Slipper (*C. reginae* Walter) and Larger Yellow Lady's Slipper (*C. Calceolus* L. var. *pubescens* (Willd.) Correll) blooming in 1938 none were found present in 1944. In the interval, this region, also just outside the cities' limits, has been cleared and partially drained. Fortunately there is another colony of *C. reginae*, 20 miles north-west but it, too, is in a region that is being "developed". Both *C. reginae* and *C. pubescens* occur at Thunder Cape where an area has recently been set aside as a Provincial Park. What will be its effect on such showy plants? There, too, we have seen the rare but inconspicuous Auricled Twayblade (*Listera auriculata* Wiegand) and there the Bog Adder's Mouth (*Malaxis paludosa* (*L.*) Sw.) has been found on three occasions, the only place in Canada where it is known to occur (Allin, A. E., *Can. Fd. Nat.*, 54:59, 1940). Fortunately the Stemless Lady's Slipper (*C. acaule* Aiton) is common and widespread and is not soon likely to disappear, but Franklin's Lady's Slipper (*C. passerinum* Richardson) has not been reported in the District since Macoun recorded its occurrence at the mouth of the Pic River, on the north shore of Lake Superior.— A. E. ALLIN, FORT WILLIAM, ONT.

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[1] —The Herbarium of the Division of Botany and Plant Pathology, Department of Agriculture, Ottawa has the following specimen of **C. arietinum**: Mt. McKay, Thunder Bay, Ont., **J. Hutchinson** 33, May 29, 1938.— Editor.

# NOTES AND OBSERVATIONS

GREEN-TAILED TOWHEE, *Oberholseria chlorura* (Audubon), IN SASKATCHEWAN. — The third record of the green-tailed towhee for Saskatchewan, and for Canada, was made recently by Mr. Charles F. Holmes of Dollard, Saskatchewan. He writes that on May 18, 1944, on his place at Cloverley, near Dollard, he saw one of these birds about his garage. Recognizing it by its greenish coloration and reddish cap, he procured a gun and after a lengthy chase through tree shelter belts was able to collect the specimen. It was a female. The specimen was forwarded to the National Museum for examination. It is in typical, somewhat worn plumage. It was returned to Mr. Holmes and is now in his private collection at Cloverley.

The previous Canadian records of this species, whose normal range is the western United States of America, were also made in Saskatchewan. One was made at Tregarva, 17 miles north of Regina, Saskatchewan, where Mr. Norman Clarke collected a male in breeding condition on June 6, 1929. It was found in a small wooded coulee in open prairie country. The specimen, mounted and in good condition, is now number 2,300 in the Saskatchewan Provincial Museum, Regina. This first record was briefly mentioned in *Oologist* for 1929 (Vol. 46 No. 7, whole No. 506, p. 96) and additional data were forwarded by Mr. Holmes and Mr. F. A. Dunk, Director of the Saskatchewan Provincial Museum.

Mr. Dunk writes me that on June 28, 1935, Mr. Clarke saw another one on his place at Tregarva. It appeared quite tame and flitted a few yards ahead of him as he walked to the barn about 6 a.m. This is the second record, hitherto unpublished.— A. L. RAND, NATIONAL MUSEUM OF CANADA, OTTAWA.

THE HOARY BAT IN LAKE TOWNSHIP, HASTINGS COUNTY, ONTARIO. —The hoary bat (*Lasiurus cinereus* Beauv.), although known to have a wide range over North America, has been considered as one of our rarer species.

On August 12, 1944, when sunset colours lingered over rolling hills of the forested zone near the centre of Lake Township, leaving the valleys in deep shadow, a large form was seen flying in circles over the tree tops. This was at first believed to be a bird about as large as a nighthawk. After circling a few times, it was observed to be a large, silvery-coloured bat which, after passing temporarily from sight, reappeared with another individual of the same species. After completing a few circles at a rapid pace both disappeared from view and were not seen again. The wing expanse of these specimens was estimated at 16 inches and the flight was distinctly more rapid and direct than that of the smaller species of bats.

A short description and record of the occurrence was forwarded to Dr. R. M. Anderson, Victoria National Museum, Ottawa, and to Dr. H. B. Hitchcock, Middlebury College, Vermont, both of whom believed this to be the hoary bat. —G. H. HAMMOND, Ottawa.

# CURRENT LITERATURE

A NEW RACE OF BROWN-HEADED CHICKADEE FROM NORTHERN WASHINGTON. *By A. H. Miller, Occ. Papers Mus. Zool., Louisiana State Univ., No. 14, 1943, pp. 261-263.*

*Parus hudsonicus cascadensis* is described as a dark form, with type locality 1 mile south of Monument 83, longitude 120° 38½′, on the U.S.-Canadian boundary, 6,000 feet, Okanogan County, Washington; it undoubtedly occures in adjacent parts of British Columbia.— A. L. RAND.

# NOTES AND OBSERVATIONS

NORTHERN RECORDS OF THE MAGPIE, *Pica pica hudsonia* (Sabine). — Through the kindness of Mr. Joseph Yanik and Mr. W. H. Bryenton, the National Museum of Canada has come into possession of data and specimens of magpies that provide considerable extension of range for this species into the Northwest Territories, and in Manitoba.

The magpie is common on the southern prairies and the bluffy country adjacent, occurring erratically north and eastwards; and apparently extending its range in these directions (Taverner, 1934, *Birds of Canada*, p. 305).

In Manitoba it is a seasonally irregular resident in the southwestern section (Taverner, MS., 1939); has been recorded north to Lake St. Martin as a rare fall visitant (Shortt and Waller, 1937, *Contr. Royal Ontario Museum Zoology* [Toronto], No. 10, p. 34) and there is a record for York Factory (Preble, 1902, *No. Amer. Fauna*, 22, p. 115). Additional evidence to show that it is at least an uncommon winter resident at Herb Lake, north of The Pas, is provided by Mr. W. H. Bryenten who tells me that he has trapped near Herb Lake since 1929 and that most winters he has taken a single magpie in a steel trap set for fur bearers. These birds probably reached this area from their nearby range in Saskatchewan.

In Saskatchewan the regular northern limits of the magpie's range is probably Nipawin, where it nests and is a fairly common resident. It is recorded as a newcomer to this district (Street, *A List of the Birds of Nipawin*, 1943, Contr. 2, Yorkton [Sask.] Nat. Hist. Soc., p. 4, Mimeographed). However, the type locality is Cumberland House, on the Saskatchewan River to the east. In Prince Albert National Park it is of casual occurrence in the southern portion of the park (Soper, 1940, MS.). There is a far northern record in the fall of 1934 at Brochet, Reindeer Lake (Snyder, 1935, *Can. Field-Nat.*, 49, p. 152).

In Alberta Dr. C. H. D. Clarke found the magpie commonly about clearings north of Edmonton to Athabasca (Clarke, 1930, MS.), and there are records from Fort McMurray (Preble, 1908, *No. Amer. Fauna*, No. 27, p. 400). For Wood Buffalo Park (Soper, 1942, *Trans. Roy. Can. Inst.*, 24, p. 70) records the magpie as a new arrival in the southern extremity of the park, in 1936. Two specimens from this area are in the National Museum.

The species seems to have been hitherto unrecorded for the Northwest Territories, and Mr. Joseph Yanik has provided us with the following record. Under date of April 8, 1944, from Fitzgerald he writes "During the winter of 1943-44 I was trapping in the Dubawnt River area, about 50 miles south west of Dubawnt Lake. During this time I saw two pairs of - - Magpies. These birds were present about our camp from the month of December on. I was able to shoot three of the birds - -. This is the first time I have heard of magpies in this area and I believe that this is about as far north as these birds will go, as we are over fifty miles north of the true timber line."

Mr. Yanik sent two of these birds to the National Museum, where they arrived in good condition and have been incorporated into the collection.— A. L. RAND, NATIONAL MUSEUM OF CANADA.

RECENT OCCURRENCE OF THE WHITE PELICAN IN NORTHERN ONTARIO. — Two 1944 records of the White Pelican (*Pelecanus erythrorhynchos*), from the districts of Nipissing and Algoma, have come to the attention of the National Parks Bureau.

On July 19, 1944, an adult weighing forty-five pounds was killed by lightning at Lake Chebogamog, 11 miles northeast of Sturgeon Falls. It was picked up by a fishing party composed of Reg. Corbett, Pat Quinn and George Spencer of North Bay. The specimen was mounted for exhibition in that city.

About the middle of June, 1944, a White Pelican was shot about four miles northwest of Blind River. This specimen has been mounted by The Blind River Board of Trade.

The only other recent record for Northern Ontario is that of June, 1943, from James Bay, recorded by H. F. Lewis (*Auk*, 1944, 61. 2, 304-5). —OLIVER H. HEWITT, OTTAWA, ONTARIO.

# NOTES AND OBSERVATIONS

CORRECTIONS ON MAPS OF THE OTTAWA - BONNECHERE GRABEN AND LAKE ONTARIO HOMOCLINE. —The maps in a paper on the stratigraphy and structure of the Ottawa - Bonnechere Graben and Lake Ontario Homocline (Kay, 1942) have several errors that have come to my attention. A narrow belt of Sherman Fall along the south shore of Lake Clear north of the printed "Fault" has been omitted on plate 3b, p. 612. The east side of the Gatineau Fault should be shown as downthrown on plate 5, p. 632. Areas of Hull limestone on southern Wolfe Island and south of Cape Vincent have been mapped under the pattern of the Rockland limestone on plate 7, opposite page 646; the peninsula of Prince Edward County south of Adolphus Reach, on the same plate, should have the Sherman Fall pattern over most of its area, as properly shown on an earlier published map, (Kay, 1937, p. 279). There has been discussion of the correlation and classification of the Kirkfield and Hull limestone (Sinclair 1942). The writer believes them equivalent, but prefers the name Kirkfield (Kay, 1943, p. 599).

*Literature Cited*

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1943. Mohawkian Series on West Canada Creek, New York. *Amer. Jour. Sci.*, 271: 597-606.

Sinclair, G. W., 1942. Age of the Trenton crinoid beds at Kirkfield, Ontario (abstract) *Bull. Geol. Soc. America*, 53: 1833.

—MARSHALL KAY, Columbia University, New York, New York.

THE TURKEY BUZZARD (*Cathartes aura septentrionalis* Wied) IN QUEBEC PROVINCE. —

There are three past records of the turkey buzzard in Quebec Province, and one from nearby Labrador, according to the files of the National Museum of Canada; one specimen reported 80 miles north of Montreal, near St. Michel du Saints, June 4, 1938, (*Prov. Que. Soc. Prot. Birds* 26 *Ann. Rept.*, 1938-39, p. 9), one at Hatley, Que., July 31, 1917, (1918 *Auk*, Vol. 35, p. 84), and one caught in a steel bear trap by a hunter at Point des Monts, Que., on Aug. 27, 1894, (Comeau, 1909, *Life and Sport*, North Shore, p. 434).

The Labrador record states that one was caught in a fox trap Nov. 10, 1906, at West St. Modest, and reported by Mr. Ernest Doane of the same place, (Townsend and Allen, 1907 *Proc. Boston Soc. Nat. Hist.*, Vol. 33, p. 364, though Austin in his monograph of the Birds of Newfoundland and Labrador, 1932, *Mem. Nuttall Ornith. Club* No. 7, does not mention this record..

An additional Quebec record has come to hand from the vicinity of Wright, in Quebec, about 50 miles from Ottawa.

Mr. Horance Moffett of 72 Cameron Street, Ottawa, told me that one of these birds was shot about August, 1942, at Courtenay's Farm, on the Pickanock River, feeding on a dead calf. Since its identity puzzled the local farmers, it was taken to the Douglas Stephenson store, at Wright, where Mr. Moffett saw it, and where it was identified from bird pictures. —CLAUDE E. JOHNSON, National Museum of Canada, Ottawa.

THE SHORT-EARED OWL NESTING IN KENT COUNTY, ONTARIO. —A nest of a short-eared owl, *Asio flammeus flammeus* (Pontoppidan), was brought to my attention early in June, 1944. It was located on the ground, in the centre of a large pasture field situated on Concession 8, Raleigh township, Kent County. The nest had been watched for some time by the Morgan family on whose property it occurred. At the time of my visit, the nest was empty, but the adults and young were seen. One juvenile was collected and is in my collection.

According to the Morgan family, who were watching the birds and nest, it contained seven eggs, six of which hatched about May 12. This is the first nesting record for extreme southern Ontario. The nearest Ontario record is by Snyder (*Trans. Roy. Can. Inst.* Vol 28, 1931) for Norfolk County, some one hundred miles to the east and north of Kent County. —GEO. M. STIRRETT, Chatham, Ontario.

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# A NEW FORM OF DUSKY SHREW FROM THE PRAIRIE PROVINCES OF CANADA[1]

*By* R. M. ANDERSON *and* A. L. RAND
*National Museum of Canada, Ottawa*

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THE DUSKY SHREWS (*Sorex obscurus* group) are essentially mountain shrews of western North America, ranging from western and north-central Alaska and central-Yukon Territory south to northern New Mexico, easterly in the Mackenzie District, Northwest Territories, as far as Fort Simpson and Resolution; in most parts of British Columbia, running into several subspecies on the Pacific coast. Published records from Alberta are limited to the western part of the Province. The only published records from Saskatchewan are 13 specimens collected by Charles H. Young for the National Museum of Canada on the north edge of Cypress Hills, south of Maple Creek in southwestern Saskatchewan in 1926 (Jackson, N.A. Fauna, 1928, 122). In more recent years J. Dewey Soper has been able to collect five specimens from farther east; three in Riding Mountain National Park in southwestern Manitoba, one in Prince Albert National Park in central Saskatchewan in 1940, and one on Middle Creek, Cypress Hills, Saskatchewan, a few miles east of the Alberta-Saskatchewan boundary and about 25 miles north of the Saskatchewan-Montana International Boundary in 1941. This extends the known range of the species considerably to the eastward in some of the more elevated, timbered spots in the northern Great Plains region. Through the kindness of Mr. Soper we are able to examine and report on this series, which proves to represent a hitherto unnamed form which we propose to call

Sorex **obscurus soperi**, new subspecies.

PLAINS DUSKY SHREW.

Type: — No. 18249, Catalogue of Mammals, National Museum of Canada, Ottawa: male, adult, 2½ miles northwest of Lake Audy, Riding Mountain National Park, southwestern Manitoba, Canada; altitude, about 1740 feet; September 21, 1940; collected by J. Dewey Soper; original number 4264; skin and skull in good condition.

*Diagnosis.*— Similar to *Sorex obscurus obscurus* in size; colour considerably darker and more fuscous; skulls very similar to *obscurus* but on the average with a slightly higher, more flat-topped cranium.

*Measurements.*— Type: male, total length, 107 mm.; tail vertebrae, 45; hind foot, 12.1; two females (?) from Riding Mountain National Park measure: t.l., 108, 117; t.v., 45, 45; h.f., 12.3, 12.5. Skull of the type measures: Condylobasal length, 16.2, cranial breadth, 8.5; interorbital breadth, 3.6; palatal length, 6.5; maxillary breadth, 4.9; maxillary tooth-row, 6.0. Weight of female with length of 117 mm., 6.7 grams.

*Range.*— Southwestern Manitoba, southern Saskatchewan, and extreme southeastern Alberta; apparently restricted to the higher, timbered, local areas in the northern Plains region.

*Remarks.*— Specimens of *Sorex obscurus* from the area between the mountains of western British Columbia and Manitoba represent a number of slightly differing populations with average characters that seem to have less than taxonomic value when compared with the neighbouring populations, but there is a trend from pale, brownish-tinged animals in the Okanagan area to the very much darker and grayer Manitoba specimens. The extremes of this cline are separable at a glance. Drawing a line separating the two races must in the nature of the problem be somewhat arbitrary, but it seems best to draw it where specimens average about halfway between the extremes in characters.

Specimens from the Similkameen River (Princeton) to Kettle River (Westbridge)

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[1] —Received for publication April 23, 1945.

Vol. 59, No. 1, January-February, 1945, was issued August 16, 1945.

area of southern British Columbia are the brownest and palest; specimens from the Monashee Range (Rossland) to East Kootenay (Newgate) are slightly grayer; a large series from Waterton Lakes National Park, Alberta, average slightly darker, and are not dissimilar to specimens from Banff and Jasper National Parks, Alberta, and from northern British Columbia (Alaska Highway, Hazelton, and Wistaria). We refer these to *Sorex obscurus obscurus* Merriam (1895).

A series from the Cypress Hills in southwestern Saskatchewan, altitude about 3,700 feet, are slightly darker again and have slightly higher crania. Taken alone they perhaps would not be strikingly separable from *obscurus* and Jackson in his review of *Sorex* (1928, North American Fauna, No. 51, 122) has referred them to *S. o. obscurus*. The Manitoba specimens and the other central Saskatchewan specimens are still darker, representing the darker end of the cline, and we refer all specimens from the western escarpment of the Cypress Hills in extreme southeastern Alberta and eastward to the new race *Sorex obscurus soperi*.

Several more northern specimens are for various reasons not clearly assignable on their observed characters. A specimen from Teslin Lake, southwestern Yukon Territory, is rather pale and brownish in colour, like Westbridge material. A specimen from Fort Simpson, Mackenzie District, Northwest Territories, and one from Wood Buffalo Park, northern Alberta, (the latter taken December 5), are in the clearer gray winter pelage of which we have little comparative material, and are tentatively referred to *obscurus*. Our material of the race *soperi*, collected from June 21 to September 21, is all in summer pelage with no sign of molt.

Total number of specimens examined, 188.

*Sorex obscurus soperi*, 18 specimens:

*Alberta*: Eagle Butte, western edge of Cypress Hills, 1.

*Saskatchewan*: Cypress Hills (northern edge), south of Maple Creek, 12. Middle Creek reservoir, Twp. 5, R. 30, W. of 3rd P.M., about 25 miles north of Montana border, 1 to 4 miles east of Alberta-Saskatchewan border, 1. Prince Albert National Park, about 1700 feet, 1.

*Manitoba*: Riding Mountain National Park, 2½ miles northwest of Audy Lake, 3.

*Sorex obscurus obscurus*, 170 specimens:

*Alberta*: Banff, 1. Burmis, 8. Crowsnest Pass, 7. Jasper, 7. Moose Mountain, 1. Mountain Park, 1. Waterton Lakes, 53. Wood Buffalo Park, 1.

*British Columbia*: Alaska Highway, 7 (Lower Liard Crossing, Muncho Pass, Steamboat Mountain, Summit Pass). Creston, 4. Fairview-Keremeos summit, 1. Fernie, 1. Hazelton, 2. Hedley, 6. Keremeos, 1. Morrissey, 3. Newgate, 1. Osoyoos-Bridesville summit, 2. Wistaria, 1. Yahk, 8.

*Northwest Territories*: Mackenzie District: Fort Simpson, 1. Nahanni Mountains, 1.

*Yukon Territory*: Canol Road, 34 (Macmillan Pass, Macmillan River, south fork, Nisutlin River, Ross River, Sheldon Lake). Dezadeash Lake, 2. Teslin Post, near Teslin Lake, 1.

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# CURRENT LITERATURE

THE SUMMER BIRDS OF THE NORTHEAST SHORE OF LAKE SUPERIOR, ONTARIO. *By J. L. Baillie, Jr., and C. E. Hope, 1943. Contributions of the Royal Ontario Museum of Zoology, No. 23, pp. 1-27, with map.*

A brief survey of the area, and the personnel that took part in the field work in 1936, is followed by an annotated list of 122 species all but four of which were listed by the 1936 party. A collection of 643 skins was made, representing 93 species.

The heading for each bird is specific, even where the text states to what subspecies the specimens belong. The report would be easier to use if the subspecific determinations were indicated by the use of the trinomial in the headings. With many species, even when specimens were available and recent reviews extant, no indication of subspecies is given.

The publication does not carry the place and exact date of publication. — A. L. RAND.

# NOTES ON TWO CAPTIVE MEADOW JUMPING MICE

## (*Zapus hudsonius*)[1]

*By* R. YORK EDWARDS

*Toronto*

ON SEPTEMBER 1, 1944, at Agincourt, Ontario, a tractor ploughed up a nest of Meadow Jumping Mice containing a female and six large young. The field was covered with rank weedy growth several feet in height, and had not been worked since May. That part of the field where the nest was uncovered was low and damp, and near a weedy berry patch. I did not see the nest, since it was ploughed under before I was aware of the find, but since the nest was entirely lifted with the sod, it could not have been more than three inches below the surface at its greatest depth. It was described to me as being made of fine grass.

When the seven mammals came into my possession, half an hour after their capture, the female and three young were dead, and while the three other young were still alive, one was badly crippled, and the other slightly so. The third was in good condition. It was the last two that I kept for more than three weeks, and on which the following is based.

To give an idea of the size of these young, which I was surprised to find in the nest when so large, the average measurements of two of the three dead ones were as follows: total length 153 mm., tail 110 mm., hind foot 27 mm. For comparison the female measured; l. 212 mm., t. 126 mm., h.f. 30 mm.

My time for care of the two captives was very limited, the result being two very thin little jumpers. There was always an abundance of food for them, but they must have suffered from a sameness of diet. They ate a great deal of buckwheat, a little bread, liked a mouse food prepared for laboratory white mice, seemed to like apple, and drank milk, and water. The milk I fed to them from a small medicine dropper, (See Notes on the Rearing of Captive Young Meadow Jumping Mice by H. Roy Ivor, Can. Field-Nat. Vol. XLVIII, pp. 8-10, 1934) but later found they would lap up liquids from a small bottle cap. An interesting consequence of their thinness was the bumpy appearance of the tail caused by the skin fitting snugly over the caudal vertebrae.

In temperament they were extremely nervous, trembling quite noticeably at all times, and starting violently at sharp sounds, sudden draughts of air, and sudden, quick movement on my part, or on the part of the other mouse. It was the last of these three that invariably resulted in panic, with the wild leaping, for which the species is named following. In regard to their leaps, it was quite evident they had no idea where they were going to land; and the only obstacle they would avoid at such times was a wall or similar large barrier immediately in front of them. Even in their more sane all-four progression, they would run, or even creep, over the edge of a table without the least hesitation. It might be noted here that they could run quite swiftly, indeed as fast as any *Microtus* I have ever caught by hand.

They spent most of the day sleeping together in little chambers they made in the centre of large wads of cotton, provided for that purpose. They fed mostly at night, and at times became quite active if the mad scrambling sounds issuing from the cage were any indication of the same. Only on a few occasions did they voluntarily feed during the day.

Especially while drinking liquid, they washed their faces frequently, even at times reaching behind their ears. Washing about the mouth was the most frequent form observed. No effort was seen to wash other parts of the body, except to clear the anus of clinging excrement.

They passed excrement frequently, as many as four and a half pellets being dropped by one in about thirty seconds, and in the next four minutes it dropped five more.

As to their senses I gained no conclusive data, but the following is of interest. Sight was good on quick movements. But when a dropper full of milk was slowly lowered to within an inch ahead and above the nose, the food was not recognized, even though the light was subdued to almost twilight conditions. The animal at once began sniffing the air, however, and after several seconds would find the food in this way. Similarly, if a drop of milk was let fall at its very feet, the large drop was not seen, but smelled out.

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[1] —Received for publication October 26, 1944.

As regards the voice, I heard two distinctly different sounds. Usually they were quite silent but for the odd chatter of teeth, or the noise of movement. On only three occasions during the twenty-four days did I hear any vocal sound from them. Two occasions were in the evening, the other at midnight. The sound heard but once was a few, high, bird-like "chips" singly, but twice in a short series. It was so like the notes of some night migrating birds in the fall, I had to put my ear to the cage to assure myself I was not hearing a bird. The second sound was entirely different, and was heard twice the same night. The first was a series of notes that might be written

*cho— cho— cho—*
*"cho cho"*

They were uttered with rapidity, and each "cho", sounded not unlike a cloth being rubbed over damp glass. When again this note was heard, it was thus: "cho..............................chocho".

On September 24 one of the mice was found dead in the nest, and true to the cannibalistic habit possessed by most rodents, the other had had a meal off his dead companion. A considerable area about the base of the tail, and the right thigh were eaten away, and the thigh bone had been broken.

To anyone with time to cater to their wants, these animals would make engaging pets. The two I had were not adverse to handling, never attempted to bite, and had many pleasing ways about them. When even timid ladies pronounced them "cute", the species must have a personality all its own.

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## BOOK REVIEW

DUCK POPULATIONS AND KILL. *By Frank C. Bellrose, Jr., Illinois Natural History Survey (Urbana) Bull. 23, (2), November, 1944, p.p. 325-372, frontis., 5 plates, 22 figs. 16 tables.*

A discussion of the effects and values of the hunting regulations under The Migratory Bird Treaty Act, based on weekly observations by the author in the Illinois River Valley for five consecutive years, and on the kill records from Illinois duck clubs for various periods.

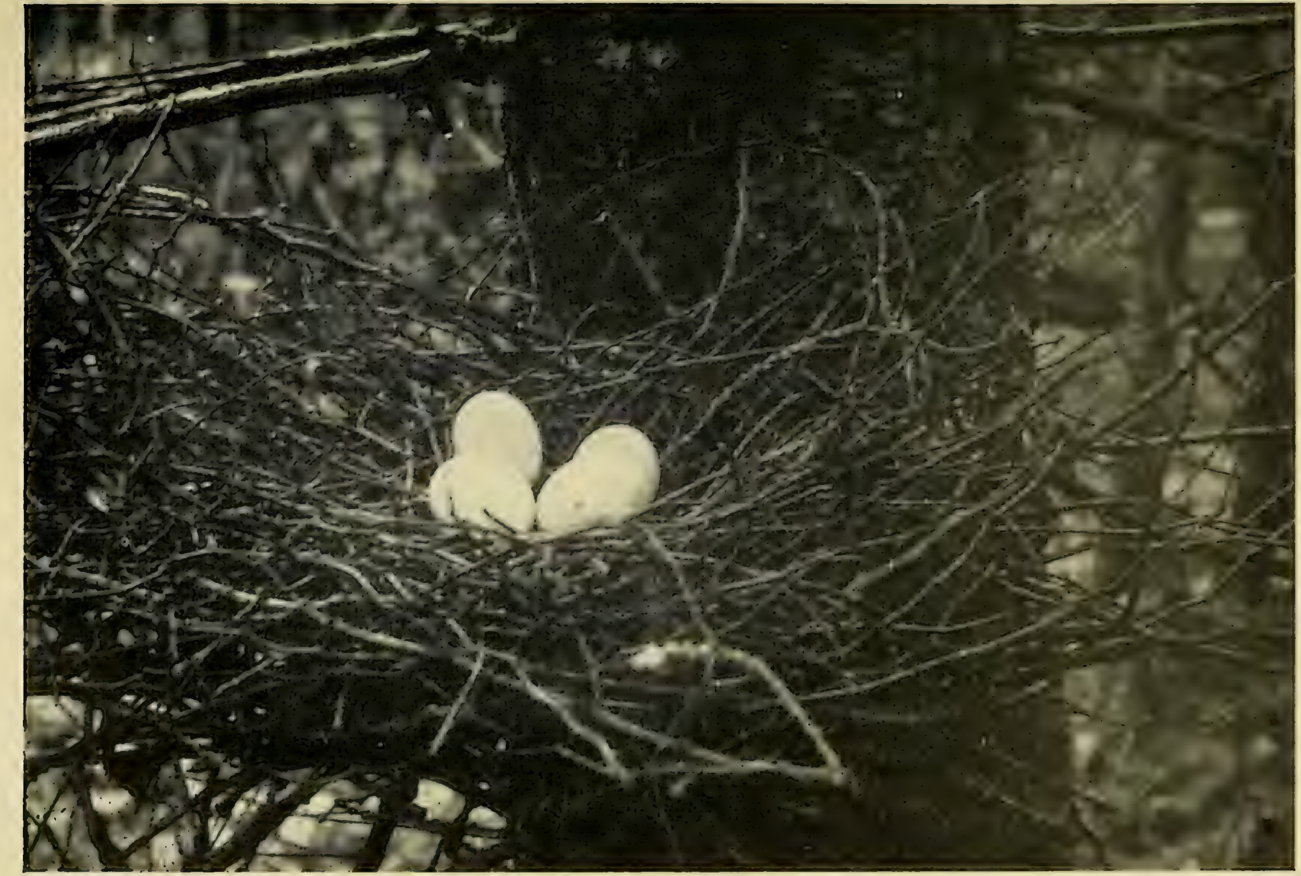
Since 1930, reductions of bag limits and possesssion limits, limitation of shooting hours, prohibition of live decoys and baiting, limitation of shells in gun to three, and reduction of the open season reduced the annual kill of ducks to half that of the preceding decade.

The kill of certain species of waterfowl in Illinois can be regulated most effectively by adjusting the opening and closing dates of the hunting season. In this regard, the migration of the twelve most important species of waterfowl, and the total waterfowl flight along the Illinois River have been determined and expressed graphically. The study revealed that the species most vulnerable to the shotgun is the shoveller, followed in order by blue-winged and green-winged teal, gadwalls, widgeons, pintails, ring-necked ducks, ruddy ducks, canvasbacks, lesser scaups, blacks and mallards. It is interesting to note that recent open seasons, wisely determined, have protected the duck species almost in that order. The blue-winged teal is protected more than any other, followed by shovellers, green-winged teal, pintails, widgeons, mallards, blacks, ring-necked ducks, canvasbacks, lesser scaups, ruddy ducks and gadwalls.

While wood ducks were killed or "found dead" in considerable numbers when given complete legal protection, the U.S. regulation in 1942-43 permitting one wood duck in the daily bag probably increased the kill in the United States as much as 66 per cent.

The Illinois state game code requires that all duck clubs keep complete records of kills, by species. The usefulness of these records is well brought out in this report.

Mr. Bellrose's paper is an excellent example of the results of the wildlife research which is being conducted by this outstanding state natural history survey. —O. H. HEWITT.



Nest and Eggs of the Eastern Green Heron, *Butorides virescens virescens* (Linn.),
Ste. Rose, Que., May 23, 1942.

# THE NESTING OF THE EASTERN GREEN HERON, *Butorides virescens virescens* (Linn.) IN THE PROVINCE OF QUEBEC, MAY, 1942 [1]

*By* HENRY MOUSLEY
*4073 Tupper Street, Montreal, Que.*

I THINK the first recorded nesting in the Province of the eastern green heron *Butorides virescens virescens* (Linn.), or as it is sometimes called the little green heron, appeared in the bird notes of the 1942 Annual Report of the Province of Quebec Society for the Protection of Birds. This being so, it would seem desirable to give the event a more extended publicity, and at the same time correct a slight error that has crept into the report. In this, we read that two nests were discovered on May 20, 1942, with three and five eggs, and another with four eggs on May 23rd, (Brown). As a matter of fact, two nests only were found, the first containing five eggs, and the second three eggs. It is this latter nest, the contents of which on the 23rd, had been increased from three to four eggs, that apparently has given rise to the error, that a third nest was found containing four eggs.

It was my good fortune to be present with Mr. Wm. Jas. Brown when these two nests were located, and has since prompted the writing of the present paper giving a more detailed account of the event. However, before proceeding with this, it may be as well to take a look at the status of this little heron in the Province.

Wintle[2] speaks of it as a "Summer Resident", scarce. When out shooting with a friend on September 1, 1857, at Caughnawaga, we saw young herons perched on the top of the low bushes of a small island there, and moved adults out of the surrounding marshes which evidently were of this species, and probably had bred in the vicinity; but we failed to get a shot at them. An adult specimen was shot May 24, 1890, at Lacolle, about 44 miles south-east of Montreal.

As regards my own experience, it certainly was a rare bird at Hatley in the Eastern Townships, as during my stay there from 1910 to 1924, I saw only three specimens, two on September 24, 1917,[3] and one on October 6, 1920. Hoyes Lloyd[4] speaks of it as a rare summer resident at Ottawa, somewhat commoner in the fall, one breeding record by P. A. Taverner and Blakely who took a nest with 5 eggs at Burritt's Rapids on the Rideau River, Ontario, June 18, 1918 the only breeding record in the vicinity.

From notes kindly supplied me by Mr. Bernard Gollop of Verdun, it appears the birds are still frequenting the neighbourhood of Caughnawaga, as he saw single individuals there on the following dates viz. Aug. 1, Aug. 23, Aug. 28, and Sept. 4, 1939; June 23, 1940, Sept. 13, 1941, and May 14, 1942.

In 1943, on his only two visits. he failed to see any birds, and since then has been unable to visit the locality again.

It is possible, the birds may eventually be found nesting at Ile aux Tourtes (Lake of two Mountains), where one or more have been seen on numerous occasions in late summer during the past few years, and as late as August 6, 1942 (P. C. Abbott).

In view of the above records, it seems probable that a gradual infiltration of the species may be taking place round the district of Montreal, which at the time of writing appears to be the most northern breeding station for the species in the Province of Quebec.

And now to return to the events that led up to the discovery of the two nests at Ste. Rose on May 20, 1942. As I remember it, we had been out since early morning searching for nests of the sharp-shinned hawk, *Accipiter velox velox* (Wilson), with very poor results, until we struck a very narrow low lying strip of the woods through which a small stream meandered on the right, or western side. This was the one selected by Brown, whilst I took the other or eastern side, not many yards separating us from one another.

It was not long before my friend called to me to come and look at a nest he had found.

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[1] —Received for publication February 10, 1945.
[2] —The Birds of Montreal, by Ernest D. Wintle, Montreal, 1896.
[3] —Auk, vol. 35, No. 3, July 1918, p. 296.
[4] —The Birds of Ottawa, 1944, Can. Field-Nat. vol 58, Sept.-Oct. 1944, No. 5, p. 146.

Naturally, I concluded it would be that of a sharp-shinned hawk. On nearing the nest, however, I seemed to sense that things were not as they should be, but what it was that gave me this feeling I could not say at the moment. However, this became evident on a nearer approach to the nest, for instead of its being close against the trunk of the tree, as is the custom of the sharp-shinned hawks, it was situated on a branch some eighteen inches from it, and although the nests of the above species are often not models of what a nest should be, this one beat all I had so far seen for untidiness, being a very flimsy affair, so much so, that neither of us thought it worth climbing to, especially as it was situated about twenty feet up in a thick balsam fir. However, Brown made a start, got about half way up, and then almost decided to come down, but luckily went on. Judge of his surprise when putting his hand over the rim of the nest to draw forth, not a beautifully marked egg of a sharp-shin, but a pale dull blue one of a green heron, an egg he had never before taken in the Province, although he had been combing the woods all round Montreal for many years past.

It was now getting late, and having no cameras with us we decided to come the next day and take photographs of the nest and eggs. Certainly, my friend had chosen the lucky side of this small strip of the woods, for before leaving it, another nest was found, also in a balsam fir, and only thirty yards from the previous one. The nest as before, rested on a branch, eighteen inches from the trunk, and twenty-one feet from the ground, but unlike the other was well built, and contained three eggs.

The day following (the 21st.) saw us again at Ste. Rose, this time equipped with cameras and other necessary impedimenta. On arrival at the site, it soon became evident that the nest could not be photographed from above, nor yet from a neighboring tree. This being so, the next best thing seemed to be, to try and lower the nest to a more convenient height from the ground. Easier said than done, for the nest as already mentioned, was of such a flimsy nature, that it would not even stand lifting up, and fell to pieces directly it was touched. However, I gathered up as many of the twigs, as I could and we set to work to reconstruct it. It was whilst doing this, that the ground directly under the nest was seen to be covered with the white droppings of the birds, a sure "give away" of a nest, (the ground under the second nest was likewise disfigured) as well as easing the strain on one's neck looking up into the trees all the time. I might mention that our attempt at nest building would have surprised the herons could they have seen it and enabled us to get a very fair picture of their set of five eggs.

On the 23rd, we again visited the site of the second nest which now contained a clutch of four eggs, and better still, as already indicated, was of a totally different construction, not being a platform of loose twigs, but a well woven boat-shaped affair, as can be seen in the accompanying illustration, that hardly required wrapping at all to hold it together. It was composed entirely of fir twigs of varying sizes, the outer ones being coarse, and the inner ones finer. The outside measurements were 14 inches long by 8 inches wide, the inside 5 x 4 inches, slightly cupped and lined with the finer twigs.

Green herons as a rule are solitary birds, and unlike most herons, are not found in flocks, and usually only one or two pairs can be found nesting together, although as many as a dozen pairs may sometimes be found associated together, but this usually applies to more southern localities. Possibly our two pairs of birds bred at Ste. Rose in 1941, or even earlier than that, as we found traces of old nests in small tamaracks and black spruce in another part of the wood, which evidently belonged to this species, and although these localities were often visited in 1943, and 1944, no further nests have since been found.

# A SURVEY OF THE ADVENTITIOUS FLORA OF IVIGTUT IN SOUTHWEST GREENLAND[1]

*By* A. E. PORSILD
*National Museum of Canada, Ottawa*

SINCE THE MINING of cryolite commenced at Ivigtut, in 1854, ships from foreign ports have called annually to bring out cargoes of ore. Warming (1888) stated that even then as many as 30 ships came to Ivigtut in one season from Denmark, Norway, Germany, the United Kingdom, Ireland from Mediterranean ports and from the United States. Some of these ships carried general cargo but a great many came in ballast. These ships did not have water ballast tanks and, by arrangement with the Mining Company, carried building materials as ballast. In that way a very considerable tonnage of sand, gravel, bricks building stone etc., was brought to Ivigtut. Also, because soil for gardens was scarce in Greenland, ship-loads of garden soil were carried from Denmark and from Scotland to Ivigtut. Ever since the mine was opened livestock and poultry have been kept to provide fresh milk, meat and eggs for the miners, and for this stock all feed, grain and hay has been imported. Thus, for almost a century there have been more opportunities for weeds of all kinds to be introduced to Ivigtut than to other Greenland ports where, due to the trade monoply, only a few Danish trading vessels called annually. Since 1940, due to the war, all imports and all ships calling at Ivigtut have come from United States and Canadian ports. As a result North American species of weeds or fodder plants may be expected to appear at Ivigtut.

From time to time botanists travelling in Greenland have visited Ivigtut and some of them have recorded the weeds that they saw growing there. The most comprehensive report was made by Aug. Berlin (1884) who, from August 19, to 22, 1883, listed 40 species of weeds growing within the town limits at Ivigtut; in 1889, from August 11 to 15, N. Hartz (1894) recorded 27 species. Smaller collections were made, in 1876, by A. Kornerup (Lange, 1880) in 1899 by J. Lindhard (Ostenfeld, 1902); in 1937, by J. Grontved (1937) and in 1937, by N. Polunin (1943). All introduced species recorded from Ivigtut prior to 1932 were enumerated by Morten P. Porsild (1932).

From 1940 to 1943, when acting as Canadian Consul to Greenland, I visited Ivigtut on a number of occasions. During one of these visits, from August 28 to September 4, 1942 I endeavoured to make a complete list of all introduced species then growing wild at Ivigtut, in order to ascertain to what extent the introduced, exotic species of weeds had been able to establish themselves in the 60 years that had passed since Berlin made the first weed survey. In the annotated list given below I have included all introduced species of weeds seen by me or, that have been recorded in literature.

Although there have been plenty of opportunities for weeds to come to Ivigtut the conditions at Ivigtut itself have been rather unfavourable to the survival of weeds. Apart from numerous small flower- and vegetable gardens for which the soil was largely imported, there is no cultivated land, nor pastures at Ivigtut. The livestock kept there is stable-fed and has never been permitted to graze. Prior to 1942 there were no roads beyond the town limits. Once established, weeds have had little opportunity for spreading, either epizoically or endozoically. House rats, once common at Ivigtut, were exterminated about 25 years ago. There are no house sparrows and no other land animals that feed on weeds or on weed seeds or that might assist in distributing weeds. A few dogs are kept at Ivigtut but they are overfed and seldom leave their homes.

The Ivigtut cryolite mine is situated on the southwest coast of Greenland, in latitude 61°12′ North and 48°11′ West. The town is built adjacent to the mine, approximately 13 miles from the open sea-coast, in a small basin carved out by glaciers into the granitic rocks of the south shore of Arsuk Fjord. The shores of the fjord in most places are steep and rocky rising to 1000 or even 2000 feet. The buildings in Ivigtut are placed haphazardly, without any system, on the few level

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[1] —Received for publication October 20, 1944.

spots near the open mine pit. There are no streets, but winding roads and foot-paths lead from house to house. The stables are near the south end of the town; in the nearby fenced-in barn-yard a number of common farm weeds were observed. Within the town limits there is a good deal of waste land not occupied by buildings or roads. The original vegetation here has suffered little disturbance and even such hemerophobous species as *Betula glandulosa, Ledum groenlandicum, Vaccinium uliginosum* and others grow undisturbed by the roadside. The surface is rocky everywhere and soil is almost absent.

Back of the town, beyond a small plain about one mile wide, a 2000 foot high granite plateau rises abruptly and extends eastwards, for about ten miles, to the edge of the great ice cap or inland ice. The small plain adjacent to the town and the slopes by which it is surrounded are watered by small brooks or streams, fed by lakes or from snow fields in the nearby hills. Dense willow thickets in which clumps of mountain ash form green "islands" cover most of the plain. Where sufficient soil has accumulated in the form of screes, especially on south or west facing slopes, a great variety of wild flowers and ferns are found.

Grønne Dal (Green Valley), three miles beyond Ivigtut, is an outwash plain from a former glacier. The gravelly river terraces are but scantily covered by a low birch scrub that scarcely justifies the name bestowed by the Ivigtut miners. Twelve miles above Ivigtut, near the head of Arsuk Fjord, a low, lake-dotted valley (Bjørnedal) provides an easy overland passage from the scenic Fox Falls on the east arm to the north arm. A "forest" of birch (*Betula pubescens*) and mountain ash (*Sorbus decora* var. *groenlandica*) formerly provided a favorite picnicing place for the miners, but unfortunately was destroyed by a fire ten years ago.

The climate of Ivigtut is oceanic rather than arctic and is considerably influenced by the warm Irminger Current. The mean for the warmest month (July) is 9.7°C. (49.5°F) and for the coldest (January) is –7.6°C. (22°F.). The mean for the year is .6°C. (33.1°F.). The high mean for July is 11.7°C. (53°F.) and the low mean for that month is 8.2°C. (46.8° F.) [2].

Killing frosts are rare or absent during June, July and August. Precipitation is comparatively high with a mean for the year of 1167 mm. (46 inches) fairly evenly distributed over the year with an average of 12 days each month when rain or snow falls. Fog and high winds are rather infrequent and 50% of all days are calm. Violent gales, generally of short duration, of the foehn or chinook type occur infrequently and, as a rule, during autumn, winter and spring.

## INTRODUCED RUDERAL PLANTS RECORDED IN THE LITERATURE OR OBSERVED (*) GROWING WILD AT IVIGTUT, AUG. 28 TO SEPT. 2, 1942.

* **Phleum pratense L.**

(TIMOTHY).—Hartz, 1889; Lindh. 1899. Well established with not quite mature fruiting panicles, Sept. 2, 1942.

* **Alopecurus geniculatus L.**

(FLOATING FOXTAIL GRASS). — Common in ditches and in wet places, Sept., 1942. No doubt fully established.

**A. pratensis L.**

(MEADOW FOXTAIL GRASS). — Hartz, 1889: tall flowering specimens. Not observed in 1942.

**Deschampsia caespitosa (L.) Beauv.**

Hartz, 1889: flowering specimens. Not observed in 1942.

**Avena sativa L.**

(OAT). — Hartz, 1889, young plants; Lindh. 1889: flowering on Sept. 20; Polunin, 1937. Not observed in 1942.

* **Poa annua L.**

(LOW SPEAR GRASS). — Berlin, 1883; Hartz, 1889: very common. Very common and completely established, Sept. 1942.

* **Festuca rubra L.**

(FESCUE GRASS). — Common in waste places where its appearance and association with known ruderals suggests introduced rather than native stock. Compare also Porsild, 1932, p. 26.

* **Lolium perenne L.**

(PERENNIAL RYE GRASS). — Occasional in waste places. Beginning anthesis, Sept. 2, 1942.

**Hordeum vulgare L.**

(BARLEY). — Lindh. 1899.

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[2] —Helge Petersen, The Climate of Greenland, in Greenland, Vol. I: 257 (1928).

**Secale cereale L.**

(RYE). — Rosenv., 1888; Hartz, 1889; Lindh. 1899.

* **Urtica dioica L.**

(STINGING NETTLE). — Flowering specimens were collected on Sept. 2, 1942; evidently well established, but perhaps fruiting only in favourable seasons.

* **U. urens L.**

(DWARF NETTLE). — Korn., 1876; Berlin, 1883: with mature fruits; Hartz, 1889; Lindh., 1899: nearly ripe fruits on July 20; Polunin, 1937. Common particularly in the barnyard where flowering and fruiting specimens were collected Sept. 2, 1942.

**Cannabis sativa L.**

(HEMP). — Berlin, 1883: sterile; Hartz, 1889: sterile; Lindh., 1899: sterile Aug. 20. Not observed in 1942.

**Rumex Acetosa L.**

(GARDEN SORREL). — Berlin, 1883: sterile specimens.

* **R. domesticus Hartm.**

(DOCK). — Berlin, 1883: sterile; Hartz, 1889: depauperate specimens; Polunin, 1937: probably a relatively recent introduction. Fully established and abundantly fruiting on Sept. 2, 1942. One of the most successful Ivigtut weeds in competition with native species.

**R. obtusifolius L.**

(BITTER DOCK). — Hartz, 1889: large, sterile rosettes.

**Polygonum Convolvulus L.**

(BLACK BINDWEED). — Berlin, 1883: sterile; Lindh., 1899: sterile, Sept. 20; Polunin, 1937.

* **P. heterophyllum Lindm. var. boreale Lge.**

(KNOTWEED). — Berlin, 1883; Hartz, 1889. Fully established Sept. 1942.

**P. nodosum Pers.**

Berlin, 1883: sterile.

**P. Persicaria L.**

(LADY'S THUMB). — Hartz, 1889: sterile.

**Chenopodium album L.**

(LAMB'S QUARTERS). — Berlin, 1883: flowering in August; Hartz, 1889; Lindh., 1899: flowering Sept. 20.

**Atriplex hastata L.**

(ORACH). — Lindh., 1899: flowers not fully expanded Sept. 20.

* **Montia rivularis Gmel.**

Common in ditches; fruiting abundantly Sept. 2, 1942. Its occurrence at Ivigtut and elsewhere in Greenland strongly suggests that the species is introduced rather than native.

* **Stellaria media L.**

(CHICKWEED). — Berlin, 1883; Hartz, 1889; Lindh., 1899: fruiting July 10. Common and fully established Sept. 1942.

**Spergularia arvensis L.**

(SPURREY). — Berlin, 1883: flowering specimens.

**Melandrium album Garcke.**

(WHITE CAMPION). — Hartz, 1889: sterile.

**Cerastium vulgatum L.**

(COMMON MOUSE-EAR CHICKWEED). — Berlin, 1883; Lindh., 1899: flowering, Sept. 20.

* **Ranunculus repens L.**

(CREEPING BUTTERCUP). — Hartz, 1889; Lindh., 1899; Deichm., 1902. Fully established, with flowering and fruiting specimens, Sept. 2, 1942.

**Chelidonium majus L.**

(CELANDINE). — Berlin, 1883: flowering and fruiting.

**Fumaria officinalis L.**

(FUMITORY). — Lindh., 1899: with flowers and immature fruits Aug. 21.

**Papaver dubium L.**

(SMOOTH-FRUITED POPPY). — Lindh., 1899: flowering specimens Aug. 15.

* **P. nudicaule L.**

(ICELAND POPPY). — A common escape from gardens, Sept. 1942. In cultivation it does extremely well and flowers throughout the summer into late September. Young plants winter successfully and flower in June. The species was said to have been introduced into gardens 15-20 years ago.

* **Thlaspi arvense L.**

(PENNY CRESS). — Berlin, 1883: flowering specimens; Hartz, 1889: flowering and fruiting. Common in gardens and by roadsides, fruiting abundantly Sept. 2, 1942.

* **Cochlearia anglica L.**

(SCURVY GRASS). — Tall, rank specimens with immature fruits, Sept., 2, 1942.

**C. officinalis** L.

(Scurvy Grass). — Berlin, 1883: fruiting specimens.

**Sisymbrium sophia** L.

(Hedge Mustard). — Korn, 1878.

**Sinapis arvensis** L.

(Charlock). — Berlin, 1883: flowering specimens; Hartz, 1889: full-grown flowering specimens; Lindh., 1899: flowering Aug. 21.

**Brassica campestris** L.

(Rutabaga). — Lindh., 1899: with immature fruits, Aug. 21.

**B. napus** L.

(Rape). — Berlin, 1883: flowering specimens.

**Barbarea stricta** Andrz.

(Winter Cress). — Polunin, 1937.

* **Roripa islandica** (Oed.) Schintz and Thell.
*Radicula palustris* Moench.

(Marsh Cress). — Very common by roadsides and on waste places where fruiting and fully established, Sept. 1942.

* **R. silvestris** (L.) Bess.

(Yellow Cress). — Specimens collected are, with some doubt, referred to this species. Specimens collected at Ivigtut by Lindhard, in 1899, (in Herb. M. P. Porsild) are a perfect match for mine but, by Ostenfeld, were named *Nasturtium* [*Roripa*] *palustris*, although the plant is clearly perennial and has petals much longer than the sepals. My plant is also a good match for *Radicula prostrata* (Bergeret) var. *stenocarpa* Rchb. Pl. Finl. Exsicc. 1183 (Can.). *R. silvestris*, however, is a much more common weed in Europe than is *R. prostrata*, and, for this reason alone would be the more likely of the two to occur in Greenland. The species appears to be fully established at Ivigtut, although it may not mature fruits except in favourable seasons.

* **Capsella Bursa-pastoris** Medic.

(Shepherd's Purse). — Berlin, 1883: flowering and fruiting; Lindh., 1899: fruiting specimens Aug. 15. Common and fully established in gardens and by roadsides, Sept. 1942.

* **Draba incana** L. f. **hebecarpa** Lindbl.

(Whitlow Grass). — Common in waste places and by roadsides. Although my specimens are inseparable from native Greenland material its occurrence and behavior at Ivigtut strongly suggests that it is introduced here rather than native.

* **Rubus idaeus** L.

(Raspberry). — Berlin, 1883: seedlings. According to local tradition cultivated stock from Denmark was planted many years ago in a garden near the outskirts of the town. On Sept. 2, 1942 the canes bore immature fruits but the present owner of the garden informed me that ripe fruit is produced in good seasons. Escapes from this garden had successfully invaded a nearby thicket of *Salix glauca*.

**Alchemilla acutidens** Buser.

(Dew Cup). — According to Polunin (1937) E. Dahl reported this species as a "recent introduction".

**Medicago lupulina** L.

(Black Medic). — Berlin, 1883: sterile plants, Hartz, 1889: seedlings; Lindh., 1899: unopened flowers Sept. 20.

**Melilotus altissimus** Thuill.

(Melilot). — Polunin, 1937.

* **Trifolium pratense** L.

(Red Clover). — Polunin, 1937. Flowering specimens observed on Sept. 2, 1942.

* **T. repens** L.

(White Clover). — Flowering specimens were recorded by Berlin in 1883 and by Hartz in 1889. In Sept. 1942 the species was very common in gardens, in lawns and along fences and by roadsides. The species appears to flower and fruit in normal years and appears perfectly winter hardy.

**Vicia angustifolia** Reichard.

(Common Vetch). — Lindh., 1899: flowers and immature pods.

* **V. cracca** L.

(Vetch). — Common near the cemetery and along fences. The species appears to be fully established and on Sept. 2, 1942 had almost mature pods.

**V. hirsuta** (L.) S. F. Gray.

(Hairy Vetch). — Berlin, 1883: well developed specimens.

**V. sativa** L.

(Spring Vetch). — Berlin, 1883: flowering specimens.

* **V. sepium** L.

(VETCH). — A few flowering specimens were seen on Sept. 2, 1942.

* **Lathyrus pratensis** L.

Specimens with immature pods were collected on Sept. 2, 1942. The species appears to be fully established and in favourable seasons undoubtedly produces mature seeds.

**Pisum sativum** L.

(PEA). — Lindh., 1899: sterile specimens.

**Erodium cicutarium** (L.) L'Her.

(STORKSBILL). — Berlin, 1883: sterile specimens.

**Viola arvensis** Murr.

(WILD PANSY). — Lindh., 1899: flowering specimens, Aug. 15.

**Carum carvi** L.

(CARAWAY). — Hartz, 1889: specimens with flowers and immature fruits.

**Anagallis arvensis** L.

(PIMPERNEL). — Hartz, 1889.

**Lycopsis arvensis** L.

(SMALL BUGLOSS). — Berlin, 1883.

* **Myosotis arvensis** (L.) Hill.

(FIELD FORGET-ME-NOT). — Lindh., 1899; Polunin, 1937. Flowering and fruiting specimens collected Sept. 2, 1942. The species appears to be fully established.

**Lamium amplexicaulis** L.

(HENBIT). — Berlin, 1883.

* **L. pupureum** L.

(DEAD NETTLE). — Berlin, 1883; Hartz, 1889; Lindh., 1899. A common and well established weed which, on Sept. 2, 1942, had flowers and mature seeds.

**Verbascum thapsus** L.

(COMMON MULLEIN). — Berlin, 1883: sterile specimens.

**Veronica arvensis** L.

(CORN SPEEDWELL). — Lindh., 1899: flowering and fruiting plants Aug. 8.

* **V. serpyllifolium** L.

(THYME-LEAVED SPEEDWELL). — Grøtv., 1937: very common and fruiting abundantly Sept. 17. The species appeared to be fully established, and on Sept. 2, 1942 had mature fruits.

**Plantago major** L.

(COMMON PLANTAIN). — Berlin, 1883: fruiting specimens; Hartz, 1889; Polunin, 1937. Not observed in 1942.

**Galium aparine** L.

(CLEAVERS). — Berlin, 1883: sterile specimens.

* **G. uliginosum** L.

(BEDSTRAW). — Observed in flower Sept. 17, 1937 by Grøntved who predicted that the species no doubt would persist. On Sept. 2, 1942 I collected specimens with immature fruits.

**Gnaphalium uliginosum** L.

(LOW CUDWEED). — Polunin, 1937: a recent introduction.

**Anthemis arvensis** L.

(CORN CHAMOMILE). — Berlin, 1883; Lindh., 1899.

* **Achillea millefolium** L.

(COMMON YARROW). — Very common by roadsides and in waste places and in open willow thickets where it flowered and fruited abundantly Sept. 2, 1942. The occurrence and behaviour of the plant seen at Ivigtut suggested that it is of introduced rather than of native stock.

**Matricaria inodora** L.

(WILD CHAMOMILE). — Berlin, 1883: sterile.

* **M. ambigua** (Ledeb.) Kryl. see M. P. Porsild Medd. om Gronl. 92, 1: 72 (1932). Polunin, 1937 (as *M. inodora* L. var. *nana* T. & G.).

An escape from gardens which, on Sept. 2, 1942, flowered and fruited abundantly. Mrs. Fr. Anderson told me that she brought seeds from Swedish Lapland ten years ago and that she had grown it in her garden since.

* **M. Chamomilla** L.

Hartz, 1889(?); Lindh., 1899. Flowering and fruiting species were common by roadsides and waste places, Sept. 2, 1942.

**M. suaveolens** (Pursh) Buchen.

(PINEAPPLE-WEED). — Lindh., 1899 (in Ostf. as *M. discoidea* DC.) Polunin, 1937.

**Chrysanthemum leucanthemum** L.

(OXE-EYE DAISY). — Polunin, 1937.

**Artemisia vulgaris** L.

(COMMON MUGWORT). — Berlin, 1883: sterile specimens; Polunin, 1937.

* **Senecio vulgaris** L.

(COMMON GROUNDSEL). — Berlin, 1883; Hartz, 1889; Lindh., 1899; Polunin, 1937. Common and fully established by roadsides and in waste places, Sept. 2, 1942.

**Arctium tomentosum** Mill.

(BURDOCK). — Berlin, 1883.

* **Cirsium arvense** (L.) Scop.

(CANADA THISTLE). — Berlin, 1883: sterile specimens; Hartz, 1889: sterile specimens. Sterile plants observed Sept. 2, 1942.

**C. heterophyllum** (L.) Hill.

Grøntved, in 1937, saw a colony by a shelter cabin in Bjørnedal, 12 miles from Ivigtut and stated that the species was common there and gaining territory. No signs of the species could be found near this hut Sept. 2, 1942.

**Centaurea cyanus** L.

(BACHELOR'S BUTTON). — Lindh., 1899.

**C. jacea** L.

(STAR THISTLE). — Berlin, 1899.

**Crepis tectorum** L.

(HAWK'S BEARD). — Lindh., 1899.

**Sonchus oleraceus** L.

(COMMON SOW THISTLE). — Berlin, 1883.

### PLANTS CULTIVATED OUTDOORS AT IVIGTUT.

In September, 1942 the following perennials were observed in gardens at Ivigtut.

**Pinus silvestris** L.

(SCOTCH PINE). — Young plants of Danish stock were planted in the valley back of the town about 1925. Some twenty young trees were seen here in 1942; the largest being three feet high. All had been planted in too wet soil among low willows and would probably have done better in a drier, well-drained soil. A report that some trees had produced cones in 1943 could not be substantiated.

**Ribes vulgare** Lam.

(RED CURRANT). — Common in most Ivigtut gardens where it is said to bear fruit in good years. On Sept. 2, 1942, bushes were loaded with green, full-grown fruit.

**Syringa vulgaris** L.

(COMMON LILAC). — Planted in several gardens but freezes back in some years when no cover is provided. Some bushes about three feet high have persisted for many years but have never flowered.

**Rubus idaeus** L.

(RASPBERRY). — Grows well in some gardens where it is said to mature fruit in good seasons. Four foot canes with unripe fruits were seen on Sept. 2, 1942.

**Sambucus nigra** L.

(BLACK-BERRIED ELDER). — One bush near the radio station, about two feet high, has survived for many years but has never flowered.

**Rheum rhaponticum** L.

(RHUBARB). — Does very well; it flowers regularly and is perfectly winter hardy.

**Paeonia** sp.

(PEONY). — One plant has survived for many years but has never flowered.

**Viola tricolor** L.

(PANSY). — Does very well and winters. Some of the flowers seen were larger than any I have seen elsewhere.

**Papaver nudicaule** L.

(ICELAND POPPY). — One of the most successful garden flowers. Flower buds winter under the snow and flowers early in June.

**Hyacinthus, Tulipa** and **Crocus**

Do rather well and winter outdoors.

The following vegetables are successfully grown outdoors at Ivigtut but, as a rule, are started under glass: Radish, kale, turnip, spinach, lettuce, endive, leek, carrot, cauliflower, cabbage and parsley.

*Bellis*, *Nemophila*, *Tropaeolum*, Marigold, Stocks and *Reseda* were seen flowering outdoors in most Ivigtut gardens.

### DISCUSSION

A number of excursions in the neighborhood of Ivigtut as well as a very careful search of the land bordering the town failed to disclose a single instance when an introduced species has been able to establish itself outside the town limits. Even such an aggressive species as *Rumex domesticus* has not been able to gain a foothold in the willow thickets of the adjacent valley, although, once established within the town limits, it competes successfully with *Salix glauca* and with native grasses and produces an abundance of seeds annually. The same was true near the barnyard where not a single ruderal species grew outside the wire fence.

Thus, the native arctic and boreal species growing wild at Ivigtut, in a balanced association, show a remarkable latent resistance to invasion by adventitious species unaided, directly or indirectly, by man or by his domestic grazing animals. Although conditions are scarcely comparable it is interesting, nevertheless, to note that this is in close agreement with the conclusion reached by Raup (1938) in regard to woodland species of New York State. "There is good evidence here of the extreme conservatism and stability of the natural woodland association of the Forest [Black Rock Forest, Cornwall-on-the-Hudson, N. Y.]. Their species do not readily invade open lands; and they are exceedingly resistant to invasion from without, either by native or introduced ruderal plants".

M. P. Porsild (1932) has shown that introduced wild species likewise are unable to invade the native, stable, plant associations of North Greenland. He has also demonstrated conclusively that Ostenfeld's (1926) contention, that no less than one-eighth of the present native, vascular flora of Greenland has been introduced by the early Norse settlers, is untenable in the light of present-day knowledge.

It will be interesting to observe in the years to come to what extent the rapidly expanding modern Greenland sheep industry will affect the native flora.

In a forthcoming study of the flora of Godthaab district (the Norse Vestribygd) of West Greenland, I hope to contribute some further notes on the problems of "Norse Plants" in Greenland.

## CONCLUSIONS

Thirty-four species of adventitious plants were found growing wild at Ivigtut in Sept. 1942. Twenty-nine of these appeared to have become fully established and to maintain themselves by the production of seeds or, in a few cases, vegetatively. Fifteen of the species that now appear to be established were recorded in the earliest lists of Ivigtut weeds and some of them may actually have persisted there from 60 to 90 years.

Since 1883, counting a few not previously recorded species, a total of 88 species of adventitious plants have been recorded from Ivigtut but less than one-third of these have been able to survive. Most of those that did not survive were annuals and perished when unable to produce seeds. Some of them have recurred from time to time due to new introduction. Dominant in this group are the common farm weeds and fodder plants that have been reintroduced annually with imported feed, grain and hay.

Of the thirty-four species seen in Sept. 1942, nineteen are perennials and fifteen annual or biennial species. Two are escapes from gardens; the rest are cosmopolitan weeds widespread in boreal and temperate zones.

In the ninety years the cryolite mine has been in operation there has been more opportunity for common weeds, chiefly from northern Europe, to come to Ivigtut than to any other Greenland port. Although a fairly large number of species have been recorded over a period of sixty years no more than twenty-nine have become established as roadside and garden weeds. In the absence of cleared agricultural land, grazing animals, roads and railroads not a single adventitous weed has succeeded in becoming established outside the narrowly defined town limits.

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# BOTANICAL NOTES — — SUMMER OF 1944 [1]

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## WALPOLE ISLAND

THE PURPOSE of my 1944 visit to Walpole was threefold: to make additional observations upon the common milkweed, *Asclepias syriaca* L. and upon *A. Sullivantii* Engelm., (which, with a colleague, I had the good fortune to rediscover on the Island in the summer of 1943), and, if possible, to re-discover *A. purpurascens* L., the purple milkweed, which had not been reported in this region for nearly fifty years. Besides this there was the general purpose of adding to the University's herbarium as many new specimens of the Island's varied flora as possible. I was accompanied by two experienced collectors, Mr. H. Groh, of the Division of Botany, Department of Agriculture, Ottawa, and Mr. W. G. Colgrove, of the University of Western Ontario. The date for the trip, July 25, had been deliberately chosen in order to correspond very closely to the dates of my visit in 1943, July 20 and 21. The coincidence in time seemed to offer the best opportunity of noting seasonal differences between years and of instituting comparisons amongst the effects these differences would have upon the plants in which we were chiefly concerned. An attempt is made in the following notes to record some of these comparisons. If the milkweed is destined to become the basis of new industries, data of this kind must be set down and compiled during the next few years.

I may add that Mr. Groh was drawn to Walpole by a specific purpose of his own, to include the Island in his careful census of the common milkweed in Western Ontario. His systematic and rational method of estimating the territorial distribution of the plant cannot but be valuable in guiding future policy. Since this is his particular field, I shall refrain from encroaching upon it.

### (a) *Asclepias syriaca* L.

There is no doubt that at least in Western Ontario the growing season of 1944 was conspicuously more advanced than in 1943. This fact was particularly noticeable on Walpole Island. The weather of the early summer had been hotter and the rains had been less abundant. These conditions brought *A. syriaca* into the flowering and fruiting stages ahead of the usual time. Consequently, there were fewer plants in prime bloom than in average years and many more with pods of mature size. This had a very practical bearing upon the matter of harvesting pods for floss: collection had to be begun earlier if the volume sought in 1944 was to be assured. That this was more than a merely local condition was made apparent in a letter the writer had received from Mr. W. C. Jackson, manager of the Milkweed Floss Corporation of America in Petoskey, Michigan. On July 31 he wrote: "We have just run into a very peculiar situation in the southwest, that this year pods have ripened so rapidly and opened up so quickly that we thereby lost most of the crop in Oklahoma. After this experience, the other southern states are being advised to watch the plant very closely and pick pods just as soon as they are ready. Pods seem to be coming on about two to three weeks earlier this year than usual and are ripening very fast."

### (b) *Asclepias Sullivantii* Engelm.

In the Canadian Field-Naturalist, Vol. 58, No. 1, (Jan.-Feb. 1944), pp. 10-11, I recorded refinding on Walpole Island in July, 1943, several stations of *A. Sullivantii;* also on the adjoining mainland in Lambton County. This plant had last been reported on the Island by Dodge in 1894, but never before had its presence been reported on the mainland. Because of the exceptionally high water in the rivers bounding the Island and overflowing its swampy depressions we had to confine our search for the plant to a very restricted area in the northwest corner; even a part of this was inaccessible. This year, however, one's range was greatly enlarged. The result was that many more populous stations of *Sullivantii* were found and observed. Most conspicuous among these was a station spreading over a semi-boggy natural prairie lying just south of the low sandy ridge near the Island's northern tip, and another adjacent

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to the road leading to the ferry operating midway down the Island on the eastern side and connecting with the Sarnia-Wallaceburg highway. In this latter stand *Sullivanti* grew lushly amongst an equal quantity of *syriaca*. Curiously enough, we found several plants on the roadside which combined qualities of both species; their leaves had the texture of those of *Sullivantii* and the habit of clinging almost perpendicularly to the main stem, while the flowers had the general appearance of the flowers of *syriaca*. Before one can positively claim these plants as hybrids, a careful study must be made. However, under the conditions obtaining in the station, the crossing of such closely related species is not unexpected.

Good fortune enlarged for us the region in which *Sullivantii* naturally grows. On the side of the mainland road leading to Wallaceburg and between three and four miles distant from it we came across a small stand. This is the first time it has been noted in Kent County. One could not but observe that this stand lies exactly northeast from Ste. Anne's Island, and, still more distant (perhaps two miles) from Walpole, along the line of the summer and early autumn wind prevailing in that region. In 1943 by following the plausible theory that this wind would carry milkweed floss to the mainland from proved stations of *Sullivantii* on Walpole, we actually found stations of that species on the mainland where we looked for it. In the case of the Kent County station by reversing the application of the theory one might discover hitherto unknown stations on both Ste. Anne's Island and Walpole.

But the range of *Sullivantii* is now known to extend to still another county. In a letter dated August 22, 1944, Mr. William G. Dore, of Dalhousie University, and the Division of Botany, Department of Agriculture, Ottawa, has thoughtfully sent me the following record which he made while making his survey of *Asclepias syriaca* in southwestern Ontario:

"Looking through specimens collected this summer I find I have one of *A. Sullivantii* taken in Essex County, along a roadside, Concession VI of Colchester N. Township, just N.E. of Marshfield Station and about three miles directly north of Harrow."

For *Sullivantii* one may report an advancement in flowering and fruiting. However the condition did not obtain in the same degree as with *syriaca*, though the reason appears to be that, at least in this corner of Canada, *Sullivantii* normally produces its bloom somewhat later than the common species. In general, the bloom was less healthy than in 1943, apparently because pollination had, for some unknown reason, been less effective. Few pods had attained a length even of two inches.

### (c) *Asclepias purpurascens* L.

There is good reason to believe that *A. purpurascens* is still living on Walpole Island, though very rare. An Indian who resides on the Island and knows its flora well described the plant to us most accurately. The limited area in which it grows conforms fully to its normal habitat elsewhere — dry, sandy, low ridges on the border of woodlands or in oak-openings. Unfortunately, this tract was burnt over this spring and most herbage on it was killed. There is good ground for hoping that in a more favorable year *purpurascens* will yet be found on Canadian soil. Another promising area remains, that which lies along the Detroit River between Windsor and Amherstburg where Macoun reported the species many years ago.

### *Liatris spicata* (L.) Willd.

This summer our party again found *Liatris spicata* growing on the mainland, but this time in Kent County. Last summer we reported it to the northwest of Walpole Island in Lambton. The new station lies a short distance from the Island close beside the road which leads eastward to Wallaceburg from the ferry on the east side of the Island. So far as I know the only other places in Ontario in which the species has been recorded as native are Sarnia and Sandwich.

The advancement of the flowering season of 1944 beyond that of 1943 is attested by *Liatris spicata* as clearly as by *Asclepias syriaca* and *A. Sullivantii*. At the corresponding date in 1943 (July 20-21) not a single floret was even near to opening out; this summer many entire spikes holding as much as eighteen inches of solid bloom were fully blown.

# A NEW SHREW FROM ARCTIC NORTH AMERICA[1]

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*National Museum of Canada, Ottawa*

TWO WELL MARKED GROUPS of the genus *Sorex* are known to occur on parts of the Arctic coastal region of Canada and Alaska. The *Sorex arcticus* group is not known to occur in the eastern Arctic, although *Sorex arcticus arcticus* Kerr (1792), the American saddle-backed shrew, type locality, Fort Severn, Ontario, on southwest side of Hudson Bay, has been taken farther north near Hayes River in northeastern Manitoba and in the interior to the northwest as far as Norman on the Mackenzie River. A northwestern species of the *arcticus* group, *Sorex tundrensis* Merriam (1900), type locality, St. Michael, Alaska, has been recorded from many points in central Alaska, from northern Yukon Territory, and eastward in Mackenzie Delta and lower Anderson River near Liverpool Bay.

The *Sorex cinereus* group is represented by specimens currently referred to *Sorex cinereus cinereus* Kerr (1792), type locality, Fort Severn, Ontario, with records from as far northeast as Chimo, Ungava Peninsula, Quebec, and at York Factory and Churchill, Manitoba, on west side of Hudson Bay. The most easterly record of shrews along the Arctic coast is from mouth of Great Fish River (Back River of modern maps) by Richard King (1836, Narr. Journ. to shores of Arctic Ocean in 1833, 1834, and 1835, under command of Captain Back, R. N., Vol. 11, 17), listed as *Sorex forsteri* Richardson (1828, 516, type locality, "Hudson's Bay countries"), the type of which is in the British Museum and has been examined by Miller (1895, North American Fauna, No. 10, 41) who states that the specimen is a typical *personatus*, a name which is now regarded as a synonym of *Sorex cinereus* Kerr (Jackson, 1925, Journ. Mamm., Vol. 6, 86).

For a number of years there has been a specimen of long-tailed shrew in the National Museum of Canada, collected by Joseph F. Bernard on the south shore of Coronation Gulf, referred to *S. c. cinereus* on the basis of skull and dental characters although the external characters showed noticeable differences from that form. In 1941 Mr. Tom H. Manning brought to the National Museum another specimen taken in the Hudson's Bay Company's warehouse at Chesterfield Inlet, essentially similar to the Coronation Gulf specimen. Mr. Henry Voisey, post manager at Chesterfield, told Mr. Manning that shrews were very abundant during the winter of 1940-41. A/Corporal L. T. Corey, of the Chesterfield detachment of the Royal Canadian Mounted Police (letter, August 14, 1942) stated that shrews were not common, but one being seen during the winter of 1941-1942 in an igloo between Chesterfield and Rankin Inlet about 50 miles south of Chesterfield. Mr. Voisey later sent to the National Museum two pickled specimens of shrews taken about 45 miles southwest of Padlei, about 125 miles west of Hudson Bay and about 100 miles north of the Manitoba boundary, December 15, 1943, referable to the same form.

The National Museum of Canada has a very large collection of the various races of the *Sorex cinereus* group, numbering about 488 specimens representing every Province and Territory in Canada, and through the kindness of Dr. H. E. Anthony of the American Museum of Natural History we have been able to examine the shrews collected by the senior author for that institution in Alaska and the Mackenzie District. The assembled material from the Arctic and subarctic regions of Canada and Alaska demonstrate the existence of a hitherto undescribed subspecies apparently referable to the *Sorex cinereus* group, for which we propose the name

**Sorex cinereus ugyunak**, new subspecies.

ARCTIC CINEREOUS SHREW.

*Type.*— No. 31365, American Museum of Natural History, New York, male adult; Tuktuk (Tuktuyaktok), northeast side of Mackenzie River delta, south of Toker Point, Mackenzie District, Northwest Territories, Canada; September 30, 1909; collected by R. M. Anderson, original number 358.

*Diagnosis*:— Differs from the forms of *Sorex cinereus* which range to the southward in having the light colour of the underparts extending far up on the sides of the body, the brown of the back being restricted to a well-

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1. —Received for publication April 23, 1945.

defined dorsal stripe from head to base of tail; in shorter total length and shorter tail; and in smaller (but not more slender) skull with lower, less inflated cranium.

| *Measurements.*— | Total length | Tail vertebrae | Hind foot | Condylobasal length | Palatal length | Cranial breadth | Interorbital breadth | Maxillary tooth-row | Mandibular tooth-row |
|---|---|---|---|---|---|---|---|---|---|
| *Alaska*: | | | | | | | | | |
| Brooks Range (Endicott Mts. south slope) | 74 | 32 | 11.5 | 15 | 6.5 | 7 | 3.5 | 5 | 4.8 |
| Hulahula River, northern foothills of Endicott Mts. | 90 | 38 | 12 | — — | — — | — — | — — | — — | — — |
| *Keewatin District*: | | | | | | | | | |
| Chesterfield Inlet | 82 | 30 | 11 | — — | — — | — — | — — | — — | — — |
| Padlei Post | — — | — — | — — | — — | 6 | — — | 4 | 5 | 5 |
| *Mackenzie District*: | | | | | | | | | |
| Aklavik, male? | 85 | 37 | 12 | 16 | 7 | 7 | 3.2 | 5 | 5 |
| Harrowby Bay, east side Liverpool Bay, male | 71 | 25 | 10 | — — | — — | — — | — — | — — | — — |
| Horton River, south of Franklin Bay, lower, male | 75 | 28 | — — | 15 | 6 | 7.4 | 3.2 | 4 | 5.9 |
| Horton River, lower, male | 85 | 26 | — — | 15 | 7 | 8 | 3.2 | 4.2 | 5.6 |
| Tuktuk, south of Toker Point, (type) male. | 89 | 25 | 11 | 15.1 | 6 | 7.3 | 2.9 | 3.9 | 5.0 |
| Tuktuk, allotype, female | 87 | 27 | — — | — — | — — | — — | — — | — — | — — |

*Range*— The Arctic tundra region from northwestern Hudson Bay westward to the eastern end of Brooks Range (Endicott Mountains )in northeastern Alaska.

*Remarks.*— The race is very distinct from *Sorex cinereus cinereus*, the only form which approaches it geographically. The dentition of *ugyunak* is of the typical *cinereus*-group form, with the four unicuspid teeth subequal, the fourth unicuspid usually slightly smaller than the third. The skull characters differ from *cinereus* chiefly in the smaller size. In colour it recalls *Sorex tundrensis* in having a distinctly conspicuous dark dorsal stripe bordered on the sides by whitish, but the dentition is definitely not of the *arcticus* type. Occasional specimens of *cinereus* from southern Canada show a tendency toward pale-coloured sides, but it is no more than a faint indication of the condition found in this white-sided Arctic form. A specimen from Churchill is definitely *cinereus*. One specimen from Aklavik, in the wooded west branch of the Mackenzie delta, in winter pelage (November 2nd), has the pale sides only slightly indicated, and suggests that the form of the northern forests may be *cinereus*.

The only shrew previously recorded from the present Keewatin District is the Back River specimen (*ante*), which may belong to this race, but shrews are apparently common at times on the Barren Grounds west of Hudson Bay. Clarke (1940, Nat. Mus. Can. Bull. No. 96, pp. 38, 39) states that shrews of some species undoubtedly occur widely in the region, both on the barrens and in the wooded sections, and when abundant they frequent the meat caches of white trappers.

Sutton and Hamilton (1932, Memoirs Carnegie Mus., Vol. III, Part II, Sec. 1, Mammals of Southampton Island, pp. 9, 10) state that the Eskimo of Southampton Island, most of whom had lived around Repulse Bay, were familiar with the shrews which they called *Oogjewnuk* in the Repulse Bay region but had never seen any sort of shrew on Southampton Island. Sutton noted the similarity of the Aivilikmuit name *Oogjewnuk* for the shrew, to *Oogjuk*, the name given to the bearded seal (*Erignathus barbatus*), suggesting that the Eskimos know of some physical resemblances or of some quality which the two animals have in common. The senior author of the present paper noted a common similarity in the names for shrew among the Alaskan Eskimos (Bering Sea and Kotzebue Sound, *Ug-(h)rù-nak*), and the native stock of Eskimos from Mackenzie delta to Cape Bathurst, *Ug-yù-nak* (Anderson, 1913, 527, Report of the natural history collections of the expedition (1908-1912), Appendix, pp. 436-527, *in* My life with the Eskimo, V. Stefansson). Although most of these Eskimos knew the name of the shrew, few of them had actually seen specimens. On one occasion in the Mackenzie delta an Eskimo in the party saw a shrew in the cargo of a whaleboat overloaded with the gear and provision stock of the expedition. The natives were much concerned because they said the shrew would be apt to gnaw holes in a sealskin "poke" of seal oil in the bottom of the boat. They insisted on unloading the whole cargo at the next landing place but could not find the shrew. Shrews were also said by traders on the lower Mackenzie to enter storehouses and gnaw the edges of bacon slabs. As tundra mice (*Microtus operarius*) and red-backed mice (*Clethrionomys dawsoni*) also enter caches on the same range and damage food, skins and fur, the real extent of damage by shrews is problematical.

The shrews taken by the senior author at Tuktuk (Tuktuyaktok) on eastern border of Mackenzie delta were all found in old Eskimo winter houses of driftwood poles covered with slabs of sod and moss, deserted for several years. The specimen (A. M. N. H., No. 31393, orig. no. 215) taken on southern slope of Brooks Range (Endicott Mountains) in northern Alaska while hunting caribou about one thousand feet above timber line and above the level of bushy willow growth on January 13, 1909, was very active at -30° F., running on hard packed snow, darting about, and was captured with some difficulty by trampling it with snowshoe.

*Specimens examined.*— Total number, 13.[2]

*Alaska*:

Chandalar River, east branch, south slope of Brooks Range, 1.

Hulahula River, at northern foothills of Brooks Range, 1.

*Northwest Territories*:

*Keewatin District*:

*Chesterfield Inlet, 1.

*Padlei, 40 miles southwest, about 125 miles west of Hudson Bay and about 100 miles north of Manitoba boundary, 2.

*Mackenzie District*:

*Aklavik, west branch of Mackenzie delta, 1.

*Coronation Gulf, near Kogaryuak River, 1.

Harrowby Bay, east side of Liverpool Bay, 1.

Horton River, Coal Creek, south of Langton Bay, 2.

Tuktuk (Tuktuyaktok), south of Toker Point, 3.

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2.—Specimens marked by star (*) are in National Museum of Canada; all others in American Museum of Natural History, New York.

# NOTES AND OBSERVATIONS

SOME BIRD RECORDS FOR YUKON TERRITORY (1) —During the summer months of 1943 it was my privilege to spend much time in the field in the Yukon Territory, travelling there by automobile from Edmonton. A great many observations of birds were made. Examination of records of Yukon birds in the publications listed below reveals that a few of the species observed have not hitherto been recorded as members of the Yukon Territory avifauna. They are the following:—

**Least Flycatcher.**

*Empidonax minimus.*—On June 25 several specimens were observed at Watson Lake. It had been common all the way from Edmonton but none was observed in Yukon Territory beyond Watson Lake.

**Golden-crowned Sparrow.**

*Zonotrichia coronata.* —This species was observed in the dwarf alpine firs at timberline in the Cassiar Range, near the head of Swift River, June 26th.

**White-throated Sparrow.**

*Zonotrichia albicollis.* —Observed at Watson Lake, June 25th. It had been common all the way from Edmonton, but was not observed in Yukon Territory beyond Watson Lake.

**Song Sparrow.**

*Melospiza melodia.* —Observed at Squanga Lake, June 27th and August 4th-9th. This colony seemed to consist of a single pair, though there may have been more. An adult collected in August proved to be a female. Young were seen being fed by the male on the following day. The specimen, now in the National Museum of Canada, is quite dark. When it seemed that song sparrows had been left behind in the Peace River district it came as a surprise to find them breeding in a Yukon swale, with tree sparrows and norther phalaropes for company.

In addition to these species it might be mentioned that the song of Brewer's sparrow (*Spizella breweri*) was heard on July 15th at Teepee Lake in the St. Elias Range, but the bird was not seen.

These records have been checked against the following publications, believed to contain all the "first records" of Yukon birds:—

Baird, S. F., 1864-6. Review of American birds in the museum of the Smithsonian Institution. *Smiths. Misc. Coll.* No. 181, Vol. 12, Pt. 1.

Baird, S. F., Brewer, T. M. and Ridgway, R., 1874. A history of North American birds; Land Birds, Boston.

Baird, S.F., Brewer, T.M., and Ridgway, R., 1884. The water birds of North America, Boston.

Brooks, W. Sprague, 1915. Notes on birds from East Siberia and Arctic Alaska. *Bull. Mus. Comp. Zool.*, 59: 360-413.

Cantwell, George G., 1898. Birds of the Yukon trail. *Osprey* 3: 25.

Grinnell, Joseph, 1909. A collection of birds from Forty-mile, Yukon Territory, Canada. *Condor* 11: 202-207.

Ogilvie, William, 1890. Exploratory survey of part of the Lewes, Tat-on-duc, Porcupine, Bell, Trout, Peel and Mackenzie Rivers, (1887-88). *Ann. Rept., Dept. Int.*, Ottawa, 1889, Pt. 7, pp. 1-114.

Osgood, Wilfred H., and Bishop, Louis B., 1900. Results of a biological reconnaissance of the Yukon River region. *U. S. Bur. Biol. Survey, N. A. Fauna*, No. 19.

Osgood, Wilfred H., 1909. Biological investigations in Alaska and Yukon Territory. *U.S. Bur. Biol. Survey, N.A. Fauna*, No. 30.

Reed, C. A., 1904. North American birds' eggs. N.Y.

Ridgway, R., 1876. Studies of the American Falconidae. *Bull. U.S. Geol. and Geog. Surv. of the Territories*, 2: 91-182.

Ross, Bernard R., 1861. List of species of mammals and birds collected in McKenzie's River District during 1860-61. *Can. Nat. & Geol.*, 6: 441-444.

Ross, Bernard H. [=R.], 1862. On the mammals, birds, etc., of the Mackenzie River District. *Nat. Hist. Rev.*, 2, 2nd series, pp. 269-290.

Russell, Frank, 1898. Explorations in the far north. Iowa City.

Swarth, Harry S., 1926. Report on a collection of birds and mammals from the Atlin region, northern British Columbia. *Univ. Calif. Pub. Zool.*, 30:51-162.

Taverner, P. A., 1913. Zoology, In repts. Biol. Div., *Summary Rept. Geol. Surv., Dept. of Mines*, for the calendar year 1913, pp. 347-354.

Williams, M. Y., 1925. Notes on the life along the Yukon-Alaska boundary. *Can. Field-Nat.*, 39: 69-72.

— C. H. D. CLARKE, TORONTO.

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1. —Published by permission of the Director, Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa.

CANNIBAL NORTHERN PIKE OR JACKFISH (*Esox lucius.*) —On August 18, 1944, O. J. Storsater and the writer, in a large freight canoe, were measuring, (for the Dominion Government of Canada), the flow of the English River in Ontario, close to the western boundary of that province. We were a quarter of a mile above Deer Falls, which is five miles from the river mouth, approximately 50° 16′ North and 94° 58 West.

The river was 240 feet wide and 78 feet deep at its deepest point and the discharge on that day was 11,800 cubic feet per second.

We were grasping a cable stretched across the river to assist in the work, 83 feet from the right bank where the water was 48 feet deep and the velocity 1.12 feet per second, when there was a splash close by the canoe as two jackfish, locked together and struggling, came to the surface.

The larger, apparently 12 to 15 pounds in weight, was gripping the smaller (about two-thirds of its size, by the head, apparently doing its utmost to swallow the other alive. The larger was wide in the head and shoulders, deep in the body and of a very dark color. The smaller was lighter in color and slimmer in body, showing dapple and white surfaces as it threshed the water.

When first observed their body lines formed amost a right angle and the larger seemed trying to get the smaller into line to swallow it. Apparently the former had not sufficient power to hold and turn the other and keep it under water at the same time.

The aggressor forced the other under water at times, only to be forced up again by its struggles to survive, but always the tearing grip was held and slowly the smaller fish was being worked into a straight line for swallowing. A large part of its head was out of sight inside the huge mouth. The larger's head was well out of water, its huge pale eyes cold and glaring, and wide extensible jaws, lined with recurved teeth, clamped in a bull-dog grip. Arching and bending like steel springs, they struggled in a flurry of foam and flying water.

Carried by the current and their own movements, the two fish drifted toward Deer Falls. We released the cable and paddled after them, though hampered by a hanging 30 pound sounding weight, instruments and telephone wires. About 200 feet downstream from the cable, there was a great splash and both struggling fish disappeared.

We could not be sure whether the smaller had broken clear; whether the larger had been frightened by our canoe and let its victim go; whether it had made an extra effort and forced its victim under water; or whether the smaller had given up on account of exhaustion caused by its desperate efforts, as a gamey fish on a line must give up. It was almost in line for swallowing when last seen.

The two pike were within a few feet, so we had a ring-side view of the fast and furious life and death struggle.

No one in the English river area, or elsewhere with whom we discussed the battle, had witnessed a similar happening; nor had we, in years and many miles of travel over the rivers and lakes of Canada and the United States. —P. W. GRANT, Dominion Water and Power Bureau, 532 Dominion Public Building, Winnipeg, Manitoba.

MATING OF THE PACIFIC HARLEQUIN DUCK.—The complete mating performance of the Pacific Harlequin Duck (*Histrionicus histrionicus pacificus*) does not seem to have been recorded. On the 3rd April, 1943, I was able to watch this from start to finish.

My attention was first drawn to the actions of the male of a pair, swimming back and forth, more or less, in a circle, just in front of the female, at the same time continually jerking his head and neck forward in one movement. The female at first appeared quite uninterested. She remained stationary, now and then preening.

The male carried this on for some minutes, at times approaching quite close to the female; once he rose and flapped his wings as the males do when displaying in a flock. After a time the female swam towards the male and then made short shoots forward in the water. These actions excited the male whose jerking of the head became more intense and he swam after her. At first the female, when making these quick movements, did not appear to be submerging but soon this was the case; the male then followed her more closely and it looked as though he were trying to mount. The female gradually submerged until little of her body could be seen and then the male mounted. He seized and held on to the feathers at the back of her neck during the time he remained mounted, at least a quarter of a minute. After the act both birds stood up in the water and, after shaking themselves, flew off.

As I was only about 100 yards away and had binoculars it was easy to follow the sequence of events. The day was dull but fine with the tide flowing; sea with a little chop.

The place where observed, Point Lazo, Comox District, Vancouver Island, is a favorite resort for this duck, particularly for the males in eclipse; I have counted nearly three hundred there in August. The young Harlequin nests on the streams back from the sea; 12th July, 1943 I saw a female and four, third to half grown young; they still showed down on the head with yellowish side face. Close by were three birds that I was sure were birds of the year, nearly full grown. — THEED PEARSE, Courtenay, V. I., B. C.

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BEACH PEA FOUND ON OTTAWA RIVER. —In the summer of 1942 a clump of *Lathyrus* resembling the beach pea, *L. japonicus* Willd. var. *aleuticus* (Green) Fern. (*L. maritimus* (L.) Bigel.) was found on the sandy shore of the northwest part of Allumette Lake, an extension of the Ottawa River above Pembroke, Ont. The locality is the steep sandy northeast shore of Chalk Bay. The plants had no flowers at that time and were so badly defoliated that good identification was not possible. The locality was again visited in the summer of 1944 and the clump of *Lathyrus* again found to be heavily defoliated. However a smaller plant was then found growing nearby among some alders that had escaped defoliation and was in flower. This was collected and identified as being the beach pea. The specimen is now deposited in the National Herbarium. The plant has so far been found only at this locality, although the shores of the northwestern part of Allumette Lake have been repeatedly explored.

Marie-Victorin in his Flore Laurentienne mentions that the beach pea is found growing on Lake St. Peter, below Montreal. According to Gray's Manual of Botany it is a seashore plant but is found on the Great Lakes and also on Oneida Lake, N. Y. It is possible that this single, but rather large colony of beach pea at Allumette Lake is a relic of former more abundant occurrence at the time of the Champlain Sea or the Lake Nippissing stage of the Great Lakes, when much more water was discharged through the present Ottawa River and Allumette Lake occupied a much larger area. It is also possible that the present colony is the result of a recent introduction that has not yet had time to spread and is in this respect severely impeded by some defoliating agent in its present habitat.— C. HEIMBURGER, Ottawa.

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BREEDING OF *Tyrannus verticalis* IN ONTARIO. On June 26 of last year (1943) James Egan and the writer discovered a pair of Arkansas kingbirds (*Tyrannus verticalis*) and located their nest near Port Alma (Kent County), Ontario. The nest was fifteen feet in an apple tree, not far from the highway, and contained three eggs, practically identical to those of the eastern kingbird (*T. tyrannus*).

The birds seemed very sociable, nesting within ten feet of a farm house, and the presence of many humans did not seem to bother them. It is also interesting to note that in the same tree was a nest of a pair of English Sparrows (*Passer domesticus*), and in an adjacent tree nested a pair of orchard orioles (*Icterus spurius*). During our presence the birds kept up an incessant chorus of twittering, and flying about us, the female sometimes returning to her nest for some minutes. The male, however, kept his distance, but never once did he stop scolding.

Returning on July 2, we found that one egg had hatched not more than a day previous, which indicates that the eggs were laid probably about the 15th or 16th of June.

According to the records of the Royal Ontario Museum of Zoology, this is the first actual breeding of *Tyrannus verticalis* in Ontario.

In May of the previous year, (1942), Geo. Nath and John MacArthur found a pair at Cedar Springs (Kent Co.), but apparently no nest had been attempted. —CLIFFORD J. MACFAYDEN, Toronto, Ont.

AN ONTARIO SIGHT RECORD OF THE WESTERN GREBE, *Aechmophorus occidentalis*. —Recently I have given considerable attention to the birds about the head of Kempenfeldt Bay, Lake Simcoe, which is just 100 yards from my front door. This limited area has proven interesting, particularly on October 25th, 1944, when, within easy range of my Zeiss binoculars, I saw 20 different species of water and shore birds. The rarer of these species were double-crested cormorants, surf and American scoters, white rumped sandpipers, and, most interesting and most rare of all, a western grebe.

I had spent some time checking up on the different species when suddenly, well out in the choppy waters of the Bay I spotted something that puzzled me very much. It looked like a white stick, or top of a narrow mast, pointing straight up about 1½ or 2 feet out of the water. Close observation soon proved it to be a bird, but what species? As it slowly worked in toward shore and the little bay at the bend of the larger bay, the possibility of its being a western grebe became apparent, so the writer took special pains to keep very quiet, but, at the same time, made a very careful and detailed study of the bird. It came to within 30 yards of shore, remained there about 15 or 20 minutes, and then slowly worked out again into the larger bay.

The sun was at my back, so I had every advantage that good light could give. I saw clearly the yellow bill, the pure white throat and sides of face, the dark gray or slate-coloured top of head, the small rise on head (not a clearly defined crest); the pure white neck, all white except the narrow dark strip down back of neck, the dark gray back with some small light grey markings but no definite pattern. The bird was very alert and active, but very smooth in all its actions. It never plunged forward in diving, just sank quietly, the breast dipping down first, then the whole bird disappeared without commotion or effort, leaving scarcely a ripple on the smooth waters of the small bay. The bird was in a class all its own, it seemed impossible to confuse it with any other species. After a full hour's observation I was convinced and satisfied that it was a Western Grebe. A study of Roberts' 'Birds of Minnesota" has confirmed me in this belief. —E. L. BRERETON, Barrie, Ontario.

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NOTES ON A FAT WATER SHREW FROM QUEBEC. One of the charms of the study of mammals, including mankind, is the fact that the mammalogist, as he advances, can abandon sacred cows on the trail. In my youth I was told that shrews were gaunt and muscular animals of the "lean and hungry Cassius" type, with no desire for the amenities of life.

A water shrew, *Sorex palustris* subspecies, captured April 20, 1931, at Doucet, Quebec, changed my views. Trapped on the edge of a snowlined brook, whose water tested 34°F., this shrew was a fecund male, testes measuring 7 mm. x 4 mm., side glands, inside pelt, 9 mm. x 5 mm. This shrew measured 146, 65, 19. It was in winter pelage, with dorsal fur 8 mm. thick, abdominal 6 mm. thick.

The most interesting characteristic of this shrew was a "saddle" of fat, under its dorsal fur, between the shoulders. One can only conjecture as to the diet which produced this shrew, so abundantly furred and fattened. Did this animal "den-up" in semi-hibernation, like a bear or raccoon?

My landlord at Doucet gave me a starnosed mole, caught in a manure pile, a warm refuge.

Winter trips of mine to brooks at Franz, Ontario and McAdam, New Brunswick, where I captured water shrews in July, have been fruitless. —MORRIS M. GREEN, Ardmore, Pa..

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THE SCREECH OWL, AN EFFICIENT MOUSE CATCHER. —Early in January, 1945, a local farmer, (near Barrie, Ont.), brought to me a live screech owl (*Otus asio*). Not needing it as a specimen, I decided to set it free, but first asked a neighbour if he would like a good mouser in his poultry house. He was keen about it, as the mice were worrying him. We put the owl in the large poultry house late in the afternoon. Next morning my friend looked in and saw the owl high up in a corner, fast asleep, apparently well fed and satisfied after a four-day fast. The same morning, when looking around, Mr. Twiss noticed some object on a high shelf. Investigation revealed it to be a pile of dead mice; he counted twelve. Unfortunately for all concerned, our experiment didn't go any farther; the next night the owl escaped through a small ventilator.[1] —E. L. BRERETON, Barrie, Ont.

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[1] —However, screech owls have been known to kill and eat birds as large as pigeons and grouse, and to attack and attempt to carry off a large hen, while specimens of a western subspecies have been known to attack ducks, fowl, and pheasants. —Ornith. Ed.

**A 1936 SASKATCHEWAN RECORD OF THE WHOOPING CRANE.** —There is yet another and more recent appearance of these birds than those quoted by Mr. Farley (1944, *Can. Field-Nat.*, 58, p. 142), one which gladdened the hearts of several well-known bird lovers and which at the same time had a sad ending for one of this fast vanishing species.

In the last days of September, 1936, Dr. C. Cairnie, eminent Scottish naturalist, who was then residing at Mitchellton, Sask., was advised by Mr. Tom Wright (game guardian) also of Mitchellton, that four large white birds, presumably swans, were on a slough near Lake Johnson. Dr. Cairnie at once investigated, and with the help of field glasses found that the supposed swans were none other than 4 Whooping Cranes (*Grus americana*), all adult birds in their lovely white plumage.

Knowing the scarcity of these birds, he at once telephoned to Mr. Hugh Boyd, ardent bird observer, then at Regina. Mr. Boyd and other interested bird men of Regina made a hasty dash by car, a distance of some 85 miles and were fortunate to see the birds as reported. Later Mr. Boyd wrote an interesting article in the Regina Leader Post concerning this record, and their luck at having witnessed it.

In a letter to the writer, under date of November 5, 1936, Dr. Cairnie states that the birds remained in the vicinity feeding on the stubble fields until October 10, and on that date the game guardian informed him that the cranes were leaving. The birds were then heading south, flying high, and were greatly alarmed for one of their number was missing. There was only one conclusion; one had been shot.

Considerable condemnation was voiced by Mr. Boyd in the Press concerning this dastardly act, and it is to be hoped that further wanton destruction will be avoided.

This I believe is the last known occurrence of the Whooping Crane in Saskatchewan, and as 8 years have now passed, it may well prove to be their final exit.[1] —CHARLES F. HOLMES, Dollard, Sask.

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1. —In this connection it is interesting to note that F. C. Ward saw 9 Whooping Cranes at Shoal Lake, Manitoba, on April 26, 1943 (1943 Wilson Bull., 55, p. 245) and Jack Wilson reported 8 birds at Last Mountain Lake, near Simpson, Sask., Oct. 14-19, 1943 (1944, Rod and Gun, Vol. 45, No. 8, (Jan.), p. 15. —Ornith. Ed.

**IMPATIENS ROYLEI IN NEW BRUNSWICK.** In August, 1943, an unfamiliar species of *Impatiens* was found growing in profusion in waste places and damp areas near Saint John Harbour. A specimen was sent to the Division of Botany and Plant Pathology, Department of Agriculture, Ottawa, where it was identified as *Impatiens Roylei* Walp. by Harold A. Senn who stated that it was a cultivated species which rarely escapes and becomes established. This is evidently the first record of its having been established in Canada. It would seem more probable that it had been introduced from Europe in ballast than that it had escaped from cultivation in New Brunswick.

The damp and cool summer climate near the Bay of Fundy seems to favour its growth as it reaches six feet in height here.

C. A. Weatherby of the Gray Herberium who visited the New Brunswick Museum in 1944 told me that he had found *Impatiens Roylei* at Eastport, Maine, in 1926 and that it was still growing there as recently as 1940. In 1944 Mr. Weatherby also found it growing on a roadside at Wilson's Beach, Campobello, at St. Andrew's in Charlotte County, and well established on the river bank at Calais, Maine. —W. A. SQUIRES, Curator - Natural Science Department, New Brunswick Museum, Saint John, N. B.

## *ERRATUM*

In the paper by R. M. Lewis entitled "*Polypodium virginianum* in an epiphytic habitat", Vol. 59, No. 1, January-February, 1945, on page 24, line 14 of the table should read:

| | *P. vulgare* L. | *P. virginianum* L. | Cape Split Collection |
|---|---|---|---|
| Stipe length | 0.2-3 dm. | 0.1-2 dm. | 0.6-0.8 dm. |

# NOTES AND OBSERVATIONS

EASTERN PHOEBE IN NOVA SCOTIA. On April 15, 1945, an Eastern Phoebe, *Sayornis phoebe*, appeared at Gaspereau, King's County and was collected by Cecil Coldwell of that village who fortunately recognized it as something unusual. The bird, a female, was mounted by myself and is being presented to the Provincial Museum at Halifax shortly. It is a particularly small individual measuring exactly six inches, total length, with bill .37 inches and wing 3 inches.

This is the first time this species has been taken in Nova Scotia though in recent years I have recorded two sight observations made by reliable bird-men. In addition there is a questionable record from Sydney which tells of a pair having nested there in late August, 1901. —R. W. TUFTS, WOLFVILLE, N. S.

THE KENTUCKY WARBLER IN CANADA.—Smith and Devitt (The Wilson Bulletin, Vol. 55, No. 4, December, p. 247, 1943) reviewed our knowledge of the Canadian records for the Kentucky warbler, *Oporornis formosus* (Wilson). According to their article, there are three specimens and four sight records for Canada.

On May 8, 1944, I collected a male specimen near Rondeau Provincial Park, Kent County, Ontario. This is the fourth Canadian specimen. Mr. James Baillie, Jr., of the Royal Ontario Museum of Zoology, has informed me of two valid unpublished sight records as follows: one by Ken Beemer at Lynn Valley, Ontario, September 9, 1940, and one by John MacArthur in High Park, Toronto, May 12, 1944. At the present time, therefore, we have four specimens and six sight records for Canada.

The collection data and disposition of specimens now known for Canada are as follows:

Bryanston, Middlesex county, Ontario, by Robert Elliott, May 16, 1898. W. E. Saunders collection; now in Royal Ontario Museum of Zoology.

Strathroy, Middlesex county, Ontario, by A. A. Wood, May 25, 1931; now in collection of G. H. Hammond, Ottawa.

Bradford, Simcoe county, Ontario, by O.E. Devitt, May 8, 1943; now in Royal Ontario Museum of Zoology.

Near Rondeau Provincial Park, Kent county, Ontario, by Geo. M. Stirrett, May 8, 1944; now in his collection.

—GEO. M. STIRRETT, Chatham, Ontario.

KENTUCKY WARBLER *Oporornis formosus* (Wilson), AT POINT PELEE, ONTARIO. —Mrs. Allen S. Beard of Stony Hollow Farm, Algonac, Michigan, made a three-day field trip to Point Pelee, May 22-24, 1944, and in a letter to Mr. P. A. Taverner at the National Museum of Canada describing her trip and listing the 93 species of birds, gives details of a record of the Kentucky Warbler.

Mrs. Beard writes that at the base of the Point, just beyond the gate, in the trees bordering the road, was where she recorded most of the warblers, — 14 species including the Kentucky Warbler.

On the morning of May 24 "I heard a loud rather even song issuing from a large thicket and vine-covered tangle - - -We surrounded this tangle - - - A little later it [the Kentucky Warbler] came out of the undergrowth on the ground into a cleared space right in front of me. As I stood motionless, it moved to within four feet of me. There was no mistaking it. The bright yellow throat, breast and belly; the yellow mark over the eyes and extending to the bill; and most noticeable of all, the black line extending from the base of the bill to and below the eye and down the malar region — all proclaimed the adult male Kentucky Warbler."

The preceding note (p. 70 this number) by Stirrett mentions 10 Canadian records, four of them suported by specimens, all from Ontario. An additional Canadian record has been overlooked, an immature male taken Sept. 1, 1902 at Sable Island, Nova Scotia, by Jas. McL. Boutcher and sent to J. Dwight (1903, *Auk*, 20, pp. 439-440). Thus Mrs. Beard's record makes the eleventh record for Ontario, and the twelfth for Canada. —A. L. RAND, National Museum of Canada, Ottawa.

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Vol. 59 MAY - JUNE, 1945 No. 3

Museum of Comparative Zoology
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VOL. 59 SUTTON WEST, CANADA MAY-JUNE, 1945 NO. 3

# AN ORDOVICIAN FAUNULE FROM QUEBEC[1, 2]

*By* G. Winston Sinclair
*Sir George Williams College, Montreal*

Point Rouge is a village in Portneuf county, about 30 miles west of Quebec City. It is situated on the Jacques Cartier River, which near the village and for some distance downstream has cut its channel in limestones of middle Ordovician age. The presence of these limestones has been noted by Low (1892, Geol. Surv. Can. Rept. V, part L, p. 35) and Okulitch (1939, Amer. Journ. Sci. 237, p. 91), but they have never been investigated in any detail.

Shelves of limestone are exposed along the river just above the railway bridge at the village. A heavy bed of bluish limestone over two feet thick is seen at low water at the base of the section. Its fauna, so far as was seen, is similar to that of the succeeding beds. Above it are ten feet of thin-bedded limestones, which carry the fauna dealt with in this paper. About nine feet of heavier limestone, which is exposed in an inaccessible cliff, completes the section at this point. Higher beds are exposed farther downstream.

The ten feet studied in detail is made up of very varied beds, ranging from subaphanitic to quite earthy limestones. Many beds show evidence of resorting of material, and of induration before further deposition. Crinoid bases adhere to the bedding planes; large "trails" are common; broken cephalopods are found into which smaller shells have drifted. All the beds are thin (less than six inches), and individual beds vary in thickness from ½ to 4 inches in a distance of only a few feet.

Collecting conditions are not good. The beds are under water part of every year, and most of them are quite waterworn on the surfaces. Few of them yield fossils on breaking. The poverty of the material is reflected in the incomplete identifications in the list. It is certain that the faunal list could be greatly extended were more favourable outcrops studied. The fauna was collected from successive beds, but has been grouped here since no significant differences were found. *Receptaculites*, *Platystrophia* and other common fossils occur in every bed, while rarer forms like *Columnaria* were found to be so scattered as to indicate that they probably occur throughout the section. The relative abundance of the species varies from bed to bed. *Receptaculites* covers the surface of one of the upper beds. Most of the small cephalopods were found in a thin band a few inches from the bottom of the section.

## FAUNAL LIST

With the exception of the orthoconic cephalopods these identifications are as complete as the material warrants. Dr. R. H. Flower has kindly examined the brevicones and his notes on them follow this paper. The other cephalopods await detailed study.

The occurrence is indicated as being abundant (a), common (c), frequent (f), or rare (r).

f *Buthotrephis cf. succulens* Hall
f *Solenopora compacta* Billings

r *Hindia sp.*
r *Pyritonema sp.*
a *Receptaculites occidentalis* Salter

f *Columnaria halli* Nicholson
c *Lambeophyllum profundum* (Conrad)

r *Conularia trentonensis* Hall
r *Conularia* new species
f *Metaconularia cf. ulrichi* Foerste
r *Serpulites sp.*

f *Amecystis cordiformis* Sinclair n. sp.
f *Amecystis* new species
r *Carabocrinus cf. radiatus* Billings
r *Cremacrinus cf. inaequalis* (Billings)
f *Cupulocrinus humilis* (Billings)
f *Dipleurocystis* new species

---

[1] —Received for publication September 28, 1944.

[2] —Note: Since this paper was written I have been able to spend another summer studying the Trenton in the lower St. Lawrence valley. However, it seems wise to put this faunule on record at this time without waiting for the results of the larger study.

Vol. 59, No. 2, March-April, 1945, was issued October 16, 1945.

r *Glyptocystites grandis* Sinclair n. sp.
c *Heterocrinus spp.*
r *Lichenocrinus sp.*
c *"Pleurocystites" sp.*
c crinoid bases

f *Anaphragma sp.*
f *Arthroclema sp.*
r *Arthrostylus sp.*
c *Batostoma sp.*
f *B. canadensis* (Foord)
c *B. winchelli* (Ulrich)
f *B. winchelli spinulosum* Ulrich
r *Chasmatopora cf. reticulata* (Hall)
r *Corynotrypa cf. abrupta* Bassler
f *Hallopora sp.*
r *Helopora sp.*
r *Prasopora cf. contigua* Ulrich
c *P.* new species *aff. insularis* Ulrich
f *P. cf. simulatrix* Ulrich
r *Monotrypa sp.*
r *M. cf. magna* Ulrich
f *Rhinidictya sp.*
f *R. exigua* Ulrich
r *Stictoporella angularis* Ulrich
c *Stigmatella sp.*

r *Dinorthis sp.*
f *D. pectinella* (Emmons)
r *Hesperorthis cf. disparilis* (Conrad)
c *H. tricenaria* (Conrad)
c *Lingula spp.*
r *L. briseis* Billings
c *L. cf. crassa* Hall
a *L. rectilateralis major* Ruedemann
a *Onniella sp.*
f *O. paquettensis* Sinclair n. sp.
a *O. "rogata"* (Sarderson)
f *Opikina* sp.
c *O. transitionalis* (Okulitch)
f *O. wagneri* (Okulitch)
f *Parastrophina hemiplicata* (Hall)
c *Platystrophia amoena* McEwan
f *P. champlainensis* McEwan
c *Rafinesquina sp.*
r *R. cf. carlottina* Wilson
r *R. prestonensis* Salmon
c *R. alternata* (Emmons)
c *Sowerbyella sp.*
c *S. curdsvillensis* (Foerste)
a *S. punctistriata* (Mather)
f *S. youngi* (Raymond)
f *Strophomena sp.*
f *S. filitexta* (Hall)
f *Zygospira recurvirostris* (Hall)

r Pelycopod *gen. et sp. ind.*

c *Bucania sp.*
f *B. punctifrons* (Emmons)
f *Cyclonema sp.*
c *C. hageri* Billings
f *C. montrealensis* Billings
r *Holopea sp.*
c *Hormotoma gracilis* (Hall)
c *H. wilsoni* Okulitch
r *Hyolithes sp.*
f *Lophospira cf. milleri* (Hall)
f *Phragmolithes compressus* Conrad
c *Sinuites sp.*
r *Tetranota sp.*
c *Trochonema umbilicatum* (Hall)
f *Beloitoceras agaricus* Flower n.sp.
r *B. cartierense* Flower n. sp.
f *B. imitans* Flower n. sp.
r *Cyrtorizoceras rougense* Flower n.sp.
c *"Endoceras" sp.*
f *Oncoceras minor* Flower n. sp.
r *O. orthodomum* Flower n. sp.
r *"Ormoceras" sp.*
c *"Orthoceras" spp.*
f *"Spyroceras" sp.*
r *Zitteloceras cf. clarkeanum* Foerste

c *Calliops sp.*
f *C. cf. brevis* Delo
r *Calymene sp.*
a *C. senaria* Conrad
c *Ceraurus plerexanthemus* Green
r *Cybeloides sp.*
r *Encrinurus sp.*
r *E. cybeleformis* Raymond
r *Eoharpes cf. ottawaensis* (Billings)
r *Illaenus sp.*
f *Isotelus sp.*
r *Leonaspis sp.*
r *Otarion sp.*

r *Bollia simplex* (Ulrich)
r *Primitiella* sp.

## NOTES ON FOSSILS

The types and figured specimens, including those of Dr. Flower's species, are in the writer's collection. A repository will be selected later for this and other Quebec Trenton material.

*Conularia* new species.

The form listed as such is identical with one from the Leray at Ottawa, which will be described in another place.

*Amecystis cordiformis* Sinclair n. sp.
(Plate 2, figure 1)

*Cf. A. laevis* (Raymond), described as *Pleurocystites laevis* (1921; Nat. Mus. Canada, Bull. 31, p. 2, pl. 2, fig. 1-3). Theca of medium size, heartshaped, quite convex, with an obtuse ridge running down the middle of the antanal face. The size and arrangement of the plates can be seen from the figure. The lower right margin of the type is obscured by matrix. Periproct not known, as there are a number of other pleurocystids in these beds and it has not been possible to correlate the anal sides with certainty. The arms, which are well shown on some specimens, are similar to those of *A. laevis*. Raymond's species is the genotype and only described species. The present form differs from it in the greater width of the lower part of the theca, and in its greater convexity. Length, 25 mm., width, about 20 mm. Plate 5 is 7.5 mm. long and 9 mm. wide.

### *Amecystis* new species.

Echinoderms are not rare in these beds, but their preservation is tantalizing. They are usually weathered badly, so that there are few specimens suitable for description. There is certainly a new *Amecystis*, large, wide and flat, and a new *Dipleurocystis* with the lower pore rhomb lacking, but there are no specimens in the collection which could serve as types.

### *Glyptocystites grandis* Sinclair n. sp.

(Plate 2, figures 4 and 5)

*Cf. G. multiporosus* Billings (Geol. Surv. Canada, Decade 3, p. 54, pl. 3, fig. 1). Specimens from the lower Trenton Kirkfield formation at Kirkfield, Ontario have been selected for description as they are better preserved than those from Pont Rouge. This species is so similar to *G. multiporosus* that it can best be defined by listing differences which seem to be constant. It is always 1.5 to 2 times the size of the Ottawa species, but the pinnules are smaller, proportionately more closely spaced, and the brachiole facets are much less impressed. *G. multiporosus* was described from the middle Trenton "Cystid beds" at Ottawa, in which it occurs in rare colonies of a few dozen specimens each. *G. grandis* is common in the Kirkfield area. The type, which is a little damaged at the base, is 38 mm. long and about 24 mm. wide in its present somewhat flattened condition.

### *Onniella paquettensis* Sinclair n. sp.

(Plate 2, figures 2-3)

*Cf. O. whittakeri* (Raymond), described as *Dalmanella whittakeri* (1921; Nat. Mus. Canada, Bull. 31, p. 16, pl. 5, fig. 11-14). Shell of medium size, transverse, cardinal angles broadly rounded. Brachial valve flat. Pedicle valve evenly convex from front to back, highest just behind the beak; not quite evenly convex as seen from the front, with a slight angulation in the middle. Costae rather coarse, few, about 4-5 in 2 mm. at the front. Length, 11 mm., width, 14.5 mm. This species is most similar to *O. whittakeri*, from which it differs in having more rounded cardinal angles, and in being much smaller. The type specimen is one of the largest seen, while Raymond's type is 18 mm. long. The holotype is from the well known beds at Paquette Rapids on the upper Ottawa River.

### *Lingula rectilateralis major* Ruedemann

Ruedemann did not describe this variety, but suggested the name for the Trenton form in the course of a discussion of the Lorraine species (1923, New York State Mus. Bull. 262, p. 110). However he referred to Hall's description of *Lingula quadrata* (*inter alia*), and it would seem proper to designate the original of Hall's plate 30, figure 4 a and b (1847, Pal. New York, vol. 1) as type of this variety. The specimen is listed in the catalogue of the American Museum of Natural History as number 679/2.

## CORRELATION

The main purpose of this note is to record the presence of this faunale, but some notes on its probable age are necessary even though they must be incomplete. Okulitch, in his necessarily hurried examination of the beds, concluded that they were Black River. And indeed there are a number of species which have traditionally been considered as typifying that group. Whether they actually have any such significance is doubtful.

The precise nature of the Black River fauna has until recently been a mystery. In his monograph on the Trenton group Kay (1937, Geol. Soc. Amer. Bull. 48, p. 252) decided that the abundantly fossiliferous beds at Ottawa and Paquette Rapids which had always been called Leray were of Trenton age, and referred them to his new Selby member of the Rockland. The latter formation he stretched downward. Since there were at that time no available faunal lists from the Black River I spent two weeks the following summer in the Watertown area in an attempt to see what fossils the typical Leray really held. The results were very meagre.

Only twenty species, other than cephalopods, were found, and they were all forms which occurred in the Ottawa "Leray" or at Paquette Rapids. Those specifically determinable were: *Columnaria halli, Lambeophyllum apertum, L. profundum, Camarella cf. panderi, Rafinesquina alternata* (these specimens are not immediately accessible, and were identified before Miss Salmon's work on this group), *Rhynchotrema increbescens, Cyrtodonta canadensis, Vanuxemia inconstans, Helicotoma cf. larvata, Liospira vitruvia, Lophospira perangulata, Maclurites logani, Illaenus cf. latiaxiatus* and *Isotelus gigas.* Since this fauna was so small it was not published, but it was confusing.

Recently F. P. Young, Jr., has published a thorough paper on the Black River group, which includes a description of the Chaumont (including Leray) formation, (1943, Amer. Jour. Sci. 241, p. 209). In it he lists only nineteen species from the Chaumont of northwestern New York, apart from cephalopods. Of these only four, *Leptaena radialis, Rhynchotrema cf. minnesotensis, Rafinesquina clara* and *Ceraurinus scofieldi* have not been found in the Trenton as defined by Kay.

In the meantime Kay has put the Ottawa "Leray" back in the Black River, except for the top few feet which, with the Paquette Rapids beds, stay as Selby Trenton (1942, Geol. Soc. Amer. Bull. 53, p. 599).

Beds intermediate in age between the typical Black River and the basal Trenton as exposed at Trenton Falls were recognized in Canada by Billings, and have been mentioned by all students since, as "transition beds", or otherwise. It would seem that if they are to have a geographic name it should be Selby, but the question of their Black River or Trenton affinities seems to be as much a matter of taste as ever. This great difficulty in deciding what is on which side of the line may be largely due to trying to draw a line where there is none in nature.

The Pont Rouge beds here considered have much in common with the Ottawa Valley Rockland, and may be considered as possible correlatives. Such species as the *Receptaculites, Hesperorthis, Phragmolithes* and *Opikina* support this reference. *Columnaria* and *Lambeophyllum* suggest the Black River. The echinoderms, of course, recall those of the lower Trenton Kirkfield (which Kay considers post-Rockland and I prefer to regard as Rockland), but it should be remembered that we know very little about this group of fossils in either the Black River or the typical Rockland.

Fortunately there is no need for a decision at the moment. The beds may be left as "possible basal Trenton" until more sections in the area can be studied.

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# BREVICONIC CEPHALOPODS FROM PONT ROUGE, QUE. [1]

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THE CEPHALOPODS described in this paper show mixed affinities. Most startling is a pronounced similarity between the species of Pont Rouge and those of the Platteville limestone of Wisconsin and Minnesota. To a lesser degree the fauna shows similarities with the beds of La Cloche Island which Kay has correlated with the Rockland. Strangely, the Pont Rouge species are almost consistently smaller and broader than their Platteville relatives. The La Cloche Island species are more similar in size, but are not so similar in general proportions as are those of the Platteville. The affinities shown with the Rockland of the Ottawa Valley are not very strong, and are suggested only by three of the species. Two of these have Platteville affinities also. Comparison with the faunas of beds of Rockland age at Montreal is not possible, because the cephalopods have not been adequately studied. There is indication, in the collections available for this study, of forms very similar to *Beloitoceras agaricus* in the Rockland of the Montreal region, but a similar though smaller and more distinct form continues into the middle Trenton.

### FAUNAL AFFINITIES OF THE CEPHALOPODS

Eight species of cephalopods are recognized, seven from Pont Rouge, and the eighth

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from a higher horizon on the Montmorency River. Six of the species show affinities to other species from the Platteville limestone of Wisconsin and Minnesota, to the Black River beds of St. Joseph Island, and to a lesser extent to the Rockland beds of La Cloche Island. Comparison of these species is summarized below.

*Zitteloceras clarkeanum* Foerste.— The Pont Rouge form differs from the typical one in contracting slightly at the aperture. Apparently it attains maturity at a smaller size than does the Platteville form, which is not known to show any such adoral contraction, though known from specimens commensurate with ours. However, no specimens from the Platteville have been described showing definite evidence of having attained maximum growth. The Pont Rouge species is not closely related to any other species of *Zitteloceras*. Probably had it been represented by better material, enough differences would have been found to warrant treating it as a distinct species. A very badly crushed specimen tentatively referred to *clarkeanum* is known also from the Rockland of Belleville, Ontario.

*Oncoceras minor* n. sp.— This is closely allied to *O. casei* Foerste of the Black River of St. Joseph Island. It is also comparable with *Beloitoceras huronense* (Billings), also of St. Joseph Island, which is less curved and has a slightly smaller size range.

*Beloitoceras cartierense* n. sp.— This is a small edition of *B. houghtoni* (Clarke) (see Foerste, 1932, pl. 33) of the Platteville, which is more strongly curved than the Pont Rouge species. Also related is an undescribed Chazyan species, much smaller than *cartierense*, from the Valcour limestone of the Champlain Valley.

*B. agaricus* n. sp.— Smaller and straighter than *B. carveri* of the Platteville. *B. clochense* of the Rockland of La Cloche Island is similar in size to *agaricus*, but is considerably more curved. Specimens from Montreal show the presence of forms very similar to *agaricus* in the Rockland there, but also forms of this general species group persist in the Montreal region as high as the Middle Trenton, and even into possible Cobourg equivalents.

*Cyrtorizoceras rougense* n. sp.— Broader in section and smaller than *C. minneapolis* of the Platteville, which is the only Ordovician form which is at all comparable.

*Oncoceras orthodomum* n. sp.—This is the only form closely allied to species previously reported from either the Montreal or Ottawa regions. It is comparable to *O. collinsi* Foerste and *O. tetreauvillense* Foerste. The former was described from the Black River at Gloucester township, Ontario (a mile or two from Ottawa), and has been listed by Kay from the Selby member of the Rockland (1937, p. 255). *O. tetreauvillense* was described from beds of Black River (Chaumont) age at "Val Tetreau, Quebec". This species, and *Zitteloceras cf. clarkeanum* are the only ones which show affinities both with the Platteville and Ottawa Valley species.

Some confusion may be caused to those not familiar with the taxonomic problems, in the comparison of species of *Oncoceras* with those assigned to *Beloitoceras*. A recent survey of the relationship of the species of these genera has led to the conclusion that they are only form genera at present, and several series of species so similar that they form an almost gradational chain pass through the present arbitrary boundaries. No remedy of the taxonomic problem is proposed because it seems inadvisable to place such a large number of species in one genus, and also because it is felt that the proper recognition of generic groups can be made only, if at all, on the basis of a more thorough study of the described species, while obviously many more forms in these genera await description. The matter is more fully treated in a work now in press (Flower, 1945).

*Beloitoceras agaricus* Flower n. sp.

(Plate 1, figures 2, 7 and 10).

This is a *Beloitoceras* of generalized aspect, known from a series of living chambers. The ventral profile is convex throughout, though the curvature is variable, its radius being as great as 60 mm. but frequently less. Usually the curvature is somewhat greater over the middle of the living chamber. The dorsum is typically faintly concave, and fairly uniformly curved, but the living chamber is breviconic owing to the median increase in curvature of the venter and the height of the shell is greatest near the mid length of the living chamber. The cross section is compressed, and in the least distorted specimens is 2 mm. higher than wide, with the venter markedly more narrowly rounded than the dorsum. Living chambers are somewhat variable in size, but are typically 15 mm. high at the base and 13 mm. wide, or 14 mm. high and 12 mm. wide.

The most complete specimens have a ventral length of 16 mm., a dorsal length of 15 mm. and a lateral length of 17mm., showing that the venter is marked by a shallow and broad hyponomic sinus, which is never prominent. The plane of the aperture is inclined orad from dorsum to venter with reference to the plane of the basal septum. The sutures develop only vestigial lobes and are transverse at the base of the living chamber. The siphuncle is small and ventral. Its structure has not been observed.

This species is intermediate in size of the living chamber between *Oncoceras minor* and *Beloitoceras imitans*. It can be distinguished readily from both by the absence of any constriction of the shell near the aperture.

*Discussion.*— The concavity of the dorsum, the faint gibbosity of the living chamber, and its slender aspect, place this in a group of *Beloitoceras* species which may be considered as among the most typical. The genotype is slightly convex on the dorsum, but more closely related to our form are *B. janesvillense* Foerste, *B. clochense* Foerste and particularly *B. carveri* Foerste. Of these *carveri* is the most closely similar in that it lacks the preoral constriction of the shell and shows only slight curvature in the living chamber. However, that species is considerably larger, more compressed, and the sutures have more strongly developed lateral lobes. *B. clochense* is rather similar in general size, but varies in one character which seems relatively constant among these perplexing species, namely, the curvature of the ventral profile, for that species is much more strongly curved than ours. No other species are closely comparable.

Eight specimens are represented from a single layer of the Pont Rouge beds. Of these one is considerably smaller than the others and may eventually prove to represent a distinct species. It is figured below as *Beloitoceras cf. agaricus*. Three of the remaining seven are exceedingly fragmentary or else badly distorted, but are evidently conspecific on the basis of similarity in size and shell proportions. A holotype and four paratypes have been designated.

*Beloitoceras cartierense* Flower n. sp.
(Plate 1, figure 5)

The holotype, a relatively complete individual, has a maximum length of 30 mm. The radius of curvature of the venter is about 30 mm. on the phragmacone and again on the living chamber, but the two regions have different centers and are separated by a short region in which the curvature becomes abruptly increased, giving the shell a faintly geniculate appearance. The dorsum is concave over the phragmocone, but becomes straight over the lower part of the living chamber and is missing adorally. The phragmocone has a ventral length of 15 mm. and a dorsal length of 14 mm. and expands from a height of slightly less than 8 mm. apically to 11 mm. at a point where measurement is taken normal to the curvature of the shell at the point at which the sutures swing farthest orad at the base of the living chamber. The width of the shell is estimated at 9 mm. where the height is 11 mm. Below the middle of the living chamber the shell height increases to 12 mm. but contracts to 11 mm. at the aperture. The living chamber has a maximum ventrolateral length of 12 mm. Ventrally there is indication of a strong and deep hyponomic sinus, but it is possible that weathering may have produced only a false imitation. The remainder of the aperture is obscure, but appears to be transverse and to slope orad in general from dorsum toward the venter, as in many strongly curved oncoceroids.

The sutures are essentially transverse adapically, but adorally they slope markedly orad from dorsum to venter. The camerae are subequal in depth and very shallow, the last five occupying a length of 5 mm.

*Discussion.*— In its small size, strongly inclined sutures, and the strongly curved and faintly geniculate shell, this species is unique. Two possibly related forms are known to the writer. One is a much smaller and more strikingly geniculate species, not as yet described, from the Valcour limestone, Upper Chazyan, of Lake Champlain. The next most closely allied form is *Beloitoceras houghtoni* (Clarke) (see Foerste, 1932, pl. 30 fig. 9-10) of the Platteville limestone of Minnesota. This is much larger, less strongly curved, and has somewhat more distant septa, but is closer to *cartierense* than any other species so far described. It still has slightly oblique sutures, a faintly geniculate shell, and one in which the apical portion is gradually expanding, with the dorsum markedly concave, while the living chamber is very faintly gibbous.

### *Beloitoceras imitans* Flower n. sp.

(Plate 1, figures 8, 9, and 11)

This is a somewhat variable species, known largely from isolated living chambers. The cross section at the base is compressed, the greatest width slightly orad of the center, but the venter only slightly more rounded than the dorsum. The ventral profile is slightly but uniformly convex throughout most of the length, but may become almost straight at the extreme aperture. The dorsal profile is nearly straight in the basal two-thirds, very slightly convex, but is constricted at the base of the outer third by a natural constriction of the entire shell, and is straight, flaring slightly to the aperture. The sides are faintly rounded in profile and converge slightly from the base toward the aperture. The shells show some slight variation in measurements. The holotype has a basal height of 18 mm. and a width of 16 mm. The living chamber is 14 mm. long on the dorsum, the constriction appearing 10 mm. beyond the base, attains a lateral length of 15.8 mm., and a ventral length of at least 14 mm. The aperture has a height of 16 mm. and a width of 14 mm. The shell is very thin, a black carbonaceous film near the aperture in all the specimens known, and was apparently very fragile. The ventral profile is very faintly curved, with a radius of at least 50 mm.

Other specimens show some variation in measurements but maintain a norm of basal diameters with a height of 16 mm. to 19 mm. and a width of from 12 mm. to 14 mm. Some variation is natural, other variation is due to slight pressure. Some of the shells have been flattened in the usual way, with an increase in horizontal measurements, while others have been flattened without an increase in horizontal expansion, in which case crushing of the shell is usually evident.

No trace of the surface features is preserved. A basal zone is developed on some specimens, indicating maturity. The suture has developed a very slight lateral lobe, but is normal to the axis of the shell. The aperture is in the main also normal to the shell axis and nearly perpendicular to the suture, but swings slightly apicad on the venter, forming a shallow and very obscure hyponomic sinus.

Two flattened specimens regarded as conspecific with the above on the basis of similarity of the living chambers, present the aspect not of *Beloitoceras* but of typical *Oncoceras*. The more complete of these specimens has a length of 31 mm. The living chamber has a basal height in its flattened state of 22 mm., on the dorsum a constriction begins 10 mm. beyond the base and the aperture continues 8 mm. further. The ventral length is 17 mm. Parts of four camerae are retained in a lateral length of 17 mm.

*Discussion.*— The unflattened living chambers of this species are comparable in form with those of *Beloitoceras janesvillense* Foerste (see Foerste 1932, pl. 30, fig. 1) which agrees in the constriction of the shell near the aperture, the nearly straight suture, and the very slight curvature as well as in the gradual adoral contraction of the shell both vertically and horizontally. Differences are found in the much larger size of *janesvillense,* the greater prominence of the preoral constriction on the venter, and the slightly greater angle between the plane of the septum and the plane of the aperture. However, I have no hesitation in regarding our species as a smaller and somewhat straighter edition of this form. Other comparable species are less closely related to this form. They are *B. norwoodi* (Clarke) (see Foerste, 1932, pl. 30), a still larger species with a more curved venter and a straight dorsum, and *B. carveri* (Clarke) (see Foerste, 1932, pl. 30) which lacks any trace of a preoral constriction. The holotype and six paratypes have been designated.

### *Oncoceras minor* Flower n. sp.

(Plate 1, figures 6, 12 and 13)

This is a small brevicone, intermediate in form between *Beloitoceras* and *Oncoceras,* known in the present material from one relatively complete but flattened shell (paratype) and three living chambers (holotype and two paratypes). The most complete living chamber shows a ventral profile which is slightly but nearly uniformly convex. The dorsum appears to be convex adapically but becomes markedly concave close to the aperture. Actually the basal conxevity in this specimen is exaggerated by slight weathering. Lateral profiles are convex, the greatest width being located in the basal third of the living chamber. The septum is essentially transverse and lateral lobes are vestigial. The aperture is nearly normal to the basal septum, dorsally and laterally. Possibly a slight sinus is present ventrally, but the venter is obscure on all known specimens. The section is compressed, the venter narrower than the dorsum, as is usual in this genus. The siphuncle is small and ventral. The living chamber has a basal height of 13 mm. and a width of 10 mm. It increases to a height of 14 mm. and a width of 12 mm. in the lower third of the living chamber, and decreases to a height of 12 mm. and a width of 10 mm. at the aperture. The dorsal length of the living chamber is 13 or 14 mm., the lateral length 12 mm. and the ventral length estimated at 12 mm. Two other living chambers, less complete, show only slight variation from these measurements. One suggests an aperture without a hyponomic sinus, but in all specimens the shell is very thin and represented adorally only by a thin carbonaceous film which here, as in associated species, tends to terminate in straight transverse lines from the internal mold at points which are clearly not the real aperture.

One somewhat flattened shell 24 mm. in length has a basal height of 11 mm., increasing to 14 mm. at the base of the living chamber. The phragmacone of seven camerae has a ventral length of 12 mm. and a dorsal length of 9.5 mm. The living chamber has a ventral length of 12 mm. and an apparent dorsal length of 11 mm., though dorsally the aperture is obscure and is possibly incomplete. In profile this specimen shows a venter which is convex throughout, though slightly more curved over the adoral part of the phragmacone than elsewhere, with a mean radius of curvature of about 25 mm. The dorsum appears straight, but is actually faintly convex over the extant part of the phragmacome, becoming straight over the basal part of the living chamber and then concave just before reaching the aperture.

*Discussion*.— This small species shows affinities with two others, with which it seems about equally comparable. Strangely enough, these species lie at present in two genera, *Oncoceras* and *Beloitoceras*, and this species serves to supply only one of many links connecting species which are evidently closely related but which have been separated into these genera. *O. minor* is very similar in the general shape of the shell to *O. casei* Foerste, described from the Black River of St. Joseph Island, Lake Huron. That species is known only from a specimen showing the exterior of the shell with some traces of color markings, but does not show the condition of the sutures or the length of the living chamber. However, our form is distinguished from this one by the slightly greater curvature of the venter in profile, the more marked concavity of the dorsum near the aperture, the greater gibbosity of the dorsum farther apicad, and its slightly larger size.

*Oncoceras minor* also shows a strong resemblance to *Beloitoceras huronense* (Billings) (see Foerste, 1932, pl. 30, fig. 3a-b; 1933, p. 100) agreeing very closely with this form in size, length of the living chamber, and the spacing of the camerae. However, the shell of *minor* is more strongly curved, particularly on the living chamber. The shell contracts more rapidly toward the aperture. The dorsal profile of *huronense* is straight, and is not convex at all over the adoral part of the phragmacone, although it does show a suggestion of concavity near the aperture. Yet these three species are so closely allied that it would not be surprising to find that more material from St. Joseph Island might serve to connect these two species. On the basis of the present material, our form seems to be closely allied to both, but not precisely identical with either of these St. Joseph Island species.

### *Oncoceras orthodomum* Flower n. sp.

(Plate 1, figures 14 and 15)

The holotype is a shell 50 mm. long, the basal 24 mm. belonging to the phragmocone. The ventral profile has a radius of curvature of about 55 mm. adapically, 45 mm. over the gibbous portion, and becomes slightly concave near the aperture. The dorsum is essentially straight, diverging from the venter to the middle of the living chamber where it becomes first slightly convex, reverting to slightly concave near the aperture. The lateral profiles are unknown. One side of the type is crushed, the other weathered. At the base the section is compressed, the greatest width about at the center, with the dorsum slightly flattened, the venter rounded but not in any sense angular. The height is 18 mm., the width 16 mm. The eight camerae of the phragmacone occupy a ventral length of 24 mm. and a dorsal length of 20 mm., the plane of the sutures being nearly parallell throughout, with no development of lateral lobes. The living chamber has a ventral length of 30 mm. and a dorsal length of 20 mm.; 10 mm. above its base the greatest shell height of 32 mm. is attained. There the dorsum becomes convex, and the shell contracts vertically in the next 5 mm. to 30 mm. The aperture is obscure, but apparently 30 mm. in height. Obscure traces of transverse lirae on the phragmocone indicate a rather deep hyponomic sinus, but one not clearly set off from the remainder of the aperture.

*Discussion.*— This species, by the position of the greatest shell height on the living chamber, is allied to *O. douglassi*, *O. collinsi* and *O. tetreauvillense*. The preoral constriction of the shell and the shallow camerae suggest *collinsi* and *tetreauvillense* but serve to distinguish it from *douglassi*. *O. collinsi* is a much smaller species, in which the sutures slope slightly orad from dorsum to venter especially near the base of the living chamber. The living chamber is also somewhat shorter in proportion to its height. *O. tetreauvillense* is again smaller, but is more similar in the spacing of the sutures which agree further in being subparallel and in lacking lateral lobes. In that species the venter is more strongly curved over the base of the living chamber, more concave near the aperture, while the dorsum instead of being concave at the aperture and convex near the base of the living chamber is faintly and nearly uniformly convex in profile. While our species is doubtless more closely allied to these two than to any others it cannot be considered identical with either. (See Foerste, 1932, pl. 30, for figures of these forms).

This species is represented by two specimens. The holotype is a relatively complete shell but one which is weathered on one side and complete on the other basally, though distorted adorally. The adoral distortion does not seem to have altered the vertical profile of the shell. A second specimen consists of a natural section showing the same general proportions. It shows indications of subspherical segments of the siphuncle, but is too incomplete to contribute any definite information as to the shape of the segments.

### *Oncoceras planidorsatum* Flower n. sp.

(Plate 1, figures 16 and 17)

The holotype is a relatively complete shell 50 mm. in length. The venter is strongly curved, the radius of curvature being 45 mm. basally, 32 mm. over the gibbous region, and about 45 mm. adorally. The dorsum is very nearly straight, but it is slightly convex over the adoral part of the phragmocone. The shell increases from 11 mm. and 14 mm. in the length of the phragmocone, 31 mm. ventrally and 23 mm. dorsally, to 25 mm. in width, as estimated, and 28 mm. in height. In the length of the living chamber, 30 mm. ventrally and 23 mm. dorsally, these dimensions decrease to the aperture, which is 19 mm. wide and 24 mm. high.

The sutures lack clear lateral lobes, and are normal or nearly normal to the curvature of the ventral profile, so that the planes of the septa are far from uniform adapically and adorally. Nine camerae occur in the phragmocone, varying from 3.5 to 4 mm. in depth. The last camera is not shorter than the rest. The base of the living chamber is not clearly shown and it is possible that another short camera may be present in this region. The siphuncle lies close to the venter, and is indicated on the internal mold by round markings at the adapical end of the adapical camera where it apparently lay in contact with the ventral wall of the shell.

The surface of the shell is indicated only orally, where transverse lines of growth and also faint rounded longitudinal markings can be seen. The main part of the aperture, which slopes orad from dorsum to venter slightly, gives way to a low broad hyponomic sinus which is not clearly set off from the rest of the aperture.

The type is slightly crushed on one side, but the aperture has its normal width. Possibly the widths estimated for the shell, particularly at the gibbous region, are rather small. The cross section is compressed, the greatest width at or close to the center, but the venter is somewhat more narrowly rounded than the dorsum, particularly adapically. At the aperture the difference between the dorsal and ventral sides is slight.

*Discussion.*— By the nearly straight dorsum this species might be placed in *Beloitoceras*. However its gibbosity is very strong, and the apical part of the shell is apparently essentially straight rather than strongly exogastric. Further, the greatest width of the shell is attained slightly below the base of the living chamber. The species is not comparable with any known *Beloitoceras*, being more gibbous, particularly laterally. Perhaps the closest form to this one in that genus is the much more slender form which Foerste illustrated as *B. cf. janesvillense* (Foerste, 1932, pl. 30, fig. 4) which agrees with our form in the strongly curved venter and the variation in curvature of the adapical and adoral septa. The present species is also allied to *Oncoceras douglassi*, which is a straighter more slender shell, less gibbous, but with a somewhat greater convexity of the dorsum. In its deep camerae and the absence of a constriction near the aperture this form is comparable to *O. douglassi* rather than *O. collinsi*, which presents a very different aspect on account of the very shallow camerae and the preoral constriction.

This species is from the Middle Trenton on the Montmorency River, Quebec. It was included in the present study because Sinclair thought it might be the same age as the Pont Rouge faunule. This is now known to be incorrect.

### *Cyrtorizoceras rougense* Flower n. sp.

(Plate 1, figure 3 and 4)

Two specimens from Pont Rouge represent a shell of the general form customarily included in *Cyrtorizoceras*. One is an unflattened but incomplete living chamber, the other a more flattened but complete living chamber. Apparently before distortion both had essentially the same proportions. The unflattened shell which I select as holotype expands from 10 and 12 mm. at the base to 15 mm. in height and an estimated width of 14 mm. at the aperture. The living chamber shows a maximum dorso-lateral length of 14 mm. but is obviously incomplete adorally. A good basal zone is present. Below this is an incomplete camera 1.7 mm. deep. The suture is essentially transverse with a vestigial lateral lobe. The siphuncle is small and ventral. The cross section, though compressed, is not markedly more narrowly rounded ventrally than dorsally.

The paratype is a flattened living chamber with one camera attached. It expands from a height of 11 mm. at the base to 23 mm. at the aperture. The ventral length is 18 mm., the dorsal length 14 mm. The radius of curvature of the venter in both specimens is about 42 mm.

*Discussion.*— This species is smaller and less compressed than *C. minneapolis*, the genotype, and the only Ordovician species previously described which is really typical. Foerste has also placed in *Cyrtorizoceras* *Cyrtoceras filosum* Conrad of the Trenton of New York, *C. camurum* Hall, also of the New York Trenton, but these species seem to belong more properly to the more slender *Richardsonoceras* (Foerste, 1933) which grades on the one hand into the more slender species of the genus *Beloitoceras*, and on the other into *Oncoceras*, which on morphological grounds, occurs in the Ordovician as well as in the Silurian (Flower, 1945) and is more slender, less curved and has shallower camerae than *Richardsonoceras*. It is curious that the broader section and smaller form which distinguish this species from its Platteville relatives supply again the distinguishing features which separate *Beloitoceras agaricus* from its more western relatives, and are again found in comparing *Beloitoceras imitans* with species of the Great Lakes region and northern Mississippi Valley. Smaller size again distinguishes *Beloitoceras cartierense* from its Platteville relatives, and *Oncoceras minor* is comparable among other forms with a larger and more compressed species from the same general region currently assigned to *Beloitoceras*.

### *Zitteloceras cf. clarkeanum* Foerste

(Plate 1, figure 1)

cf. *Cyrtoceras hallianum* Clarke, 1897, Geol. of Minnesota, vol 3, pt. 2, p. 805, pl. 60, fig. 11-12.

*Zitteloceras clarkeanum* Foerste, 1917, Cincinnati Soc. Nat. Hist., Jour. vol. 22, p. 52.

.......................Foerste, 1932, Denison Univ. Bull., Sci. Lab., Journ. vol. 27, pl. 27, fig. 6A-D.

.......................Foerste, 1933, *ibid.*, vol. 28, p. 83.

.......................McKelvey, 1939, Jour. Pal., vol. 13, p. 74-76, fig. 1-6.

One flattened shell from the Pont Rouge beds shows the essential form and ornament of *Zitteloceras clarkeanum*, but differs from that species in apparently being more tubular adorally. However, the shell is so flattened that accurate comparison is impossible and the specimen is therefore referred to the old species.

The specimen consists largely of the external mold of the left side of a much flattened shell. Adorally, the right side is apparently present but so flattened as to be slightly concave. The specimen has a maximum length of 50 mm., with a dorsum 30 mm. long, which extends considerably farther adapicad than the venter which is 37 mm. in length. The radius of curvature is 40 mm. for the venter and 23 mm. for the dorsum, essentially as in *clarkeanum*. In the adapical part of the shell the rate of vertical expansion is fairly rapid but adorally the shell is nearly tubular. In the last 18 mm. the height of the shell actually decreases from 23 mm. to 22 mm.

The frills of the surface are separated by relatively wide flat interspaces, and are regularly and evenly crenulate. There is irregular alternation of strong and weak frills. The surface pattern is essentially that of *clarkeanum.*

*Discussion.*— On the basis of surface markings, *Zitteloceras sensu lato* is divisible into three species groups. The first of these, included in *Zitteloceras* by Foerste, bears rounded transverse ribs rather than frills and contains the species *Z. billingsi* from the Middle Ordovician, of the Paquette Rapids, *Z. sinuatum* (Billings) from La Petite Chaudiere of the Ottawa River at Ottawa, and probably *Z. brevicameratum* of the Platteville of Wisconsin. The second group, characterized by short frills which are closely spaced and lack crenulations, was separated by Foerste (1933, p. 76) as the genus *Laphamoceras* and is typically represented only by the genotype, *L. scofieldi* Foerste of the Platteville of Minnesota. However, this surface type grades into true *Zitteloceras* through faintly crenulated species such as *Z. percurvatum* Foerste of the Platteville, *Z. tenuistriatum* (Hall) of the Platteville, and the gradation is made more complete by two undescribed Cincinnatian species. Therefore *Laphamoceras* is here considered as a part of *Zitteloceras*. Typical members of the third group, characterized by crenulated frills, include only the following: *Z. hallianum* (d'Orbigny) of the Trenton of New York, *Z. clarkeanum* Foerste of the Platteville of Minnesota and Wisconsin, *Z. hitzi* (Foerste) of the Hitz layer, equivalent to the uppermost Whitewater, of Indiana, and two additional undescribed species from the Waynesville and Whitewater respectively of Indiana and Ohio. *Z. beloitense* Foerste has distant ridges as in typical *Zitteloceras*, but only the faintest vestige of crenulation, and supplies a second link between *Zitteloceras* and *Laphamoceras*, suggesting that the surface features may not prove reliable as guides to natural genetic groups, and supplying an additional reason against the recognition of *Laphamoceras* as a distinct genus.

The present specimen is plainly of the last group. In curvature and surface markings it is closely allied only to *Z. clarkeanum.* In the indication of an adoral contraction it is suggestive instead of the *hallianum* and *beloitense* which are much smaller species, and do not resemble the Pont Rouge form at all closely due to differences in surface markings and curvature. It is possible that our form may represent a distinct species, but its affinities to *clarkeanum* are unmistakable, especially in the light of McKelvey's excellent illustrations of the surface of that species. It is not beyond the bounds of possibility, though I consider it unlikely, that the apparent adoral contraction of the shell in our specimen might be a trick of preservation.

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## EXPLANATION OF PLATES

### PLATE 1

All figures on this plate are natural size, and except 16 and 17 are of specimens from the basal Trenton at Pont Rouge, Quebec.

1. *Zitteloceras cf. clarkeanum* Foerste. Lateral view of only specimen observed from Pont Rouge.

2. *Beloitoceras agaricus* Flower n. sp. Holotype, lateral view, venter on right.

3-4. *Cyrtorizoceras rougense* Flower n. sp. (3) Holotype, a somewhat flattened living chamber, lateral view; (4) paratype, a less complete but undistorted living chamber.

5. *Beloitoceras cartierense* Flower n. sp. Holotype, lateral view.

6. *Oncoceras minor* Flower n. sp. Paratype, lateral view, venter on right.

7. *Beloitoceras cf. agaricus* Flower n. sp. A mature living chamber slightly smaller than the typical form.

8-9. *Beloitoceras imitans* Flower n. sp. (8) Paratype, showing sutures; (9) paratype, showing complete aperture.

10. *Beloitoceras agaricus* Flower n. sp. Two living chambers in contact, paratypes.

11. *Beloitoceras imitans* Flower n. sp. Holotype, a complete living chamber, lateral view, venter on left.

12-13. *Oncoceras minor* Flower n. sp. (12) Holotype, an unflattened living chamber; (13) paratype, a more complete slightly compressed specimen.

14-15. *Oncoceras orthodomum* Flower n. sp. (14) Holotype, lateral view, venter on left; (15) paratype, a natural section preserving part of a siphuncle.

16-17. *Oncoceras planidorsatum* Flower n. sp. Holotype, ventral (16) and lateral (17) views. Middle Trenton, Montmorency River, Quebec.

### PLATE 2

1. *Amecystis cordiformis* Sinclair n. sp. Holotype, x1. Pont Rouge.

2-3. *Onniella paquettensis* Sinclair n. sp. Brachial and pedicle views of the holotype x2. Middle Ordovician, Paquette Rapids, Ontario.

4-5. *Glyptocystites grandis* Sinclair n. sp. The holotype and a portion enlarged x 2. Lower Trenton Kirkfield formation, Kirkfield, Ontario.

6. A bedding plane in the Pont Rouge exposure, showing one of the frequent large "trails".

The lower picture is a view of the Pont Rouge outcrop, looking upstream from the highway bridge in the village. The beds here described are seen on the left hand side of the picture.

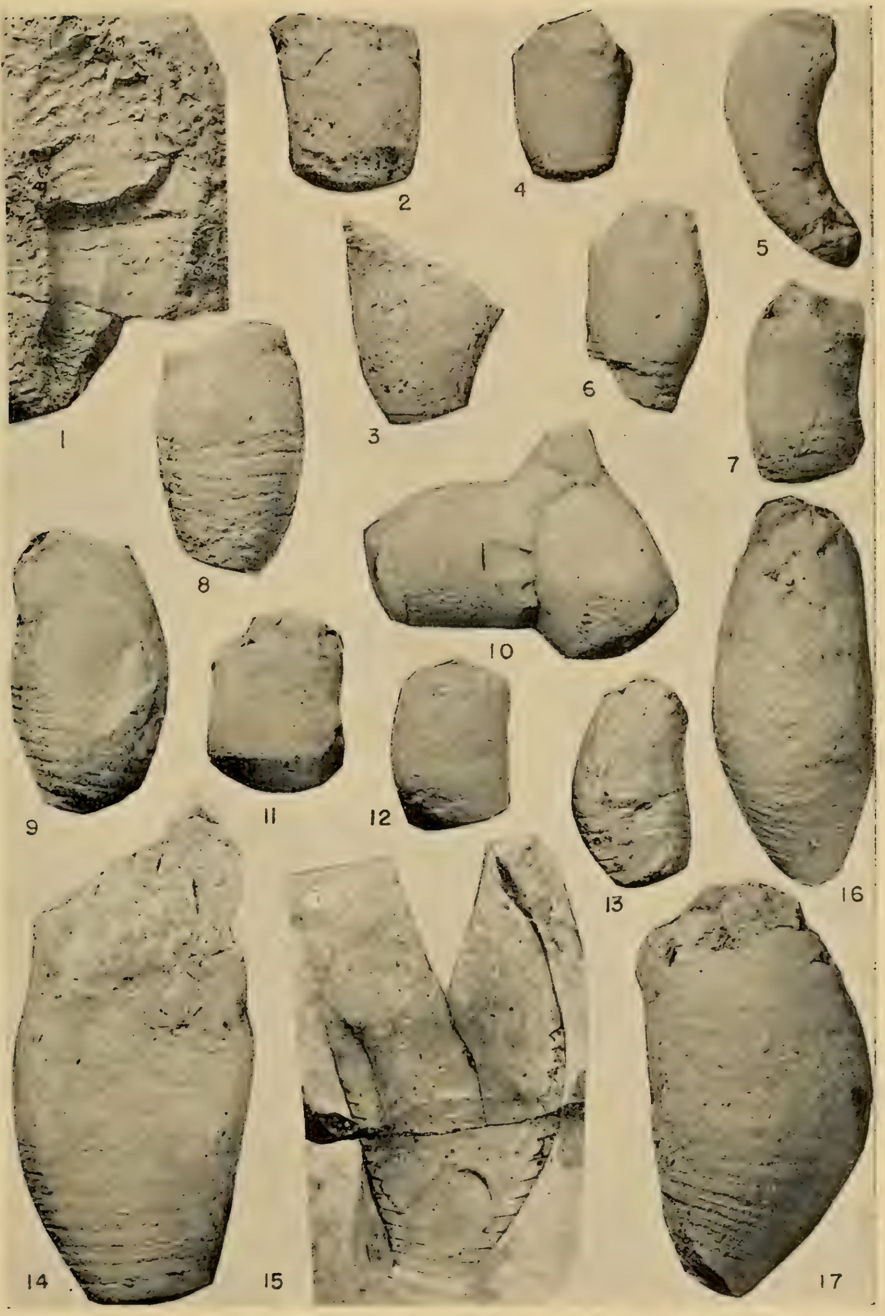

Plate I

1

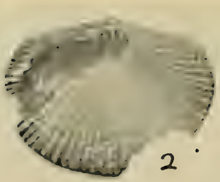

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Plate II

# BIRDS OF BANFF NATIONAL PARK, ALBERTA [1]

*By* C. H. D. CLARKE *and* IAN MCT. COWAN

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BANFF NATIONAL PARK, established in 1885, is the oldest unit of the Canadian National Parks system, and while there has never been published a list of birds of the Park area there has for many years been considerable information available on the birds of the Banff vicinity. The Park comprises an area of 2,585 square miles in the Rocky Mountains of Alberta, more or less equally divided by the 51st parallel of north latitude. In common with other Canadian National Parks, it is established as a Reserve for wildlife.

The first white man to see the Park area was David Thompson, who visited a camp of Kootenay Indians on the Upper Red Deer River in 1800, and then went with them to Rocky Mountain House. In the same year he returned to a point just outside the present boundary on the Bow River. In 1807 Thompson again visited the Park, this time up the Saskatchewan to Howse Pass. Many voyageurs subsequently crossed this pass, but the opening of the main portion of the Park area commenced with the visit in 1841 of Sir George Simpson. Thompson's associate, David McGillivray, may have been up the Bow Valley in 1800, but definite records are lacking.

While some random observations were made by the Palliser expedition of 1858-59 and by later travellers and residents, the birds of the Park were first studied by Professor John Macoun, of the then Geological and Natural History Survey, Ottawa. With the well-known collector William Spreadborough as his assistant, he spent the spring and summer of 1891 in and around Banff, collecting specimens of the plants and animals to be found there. The bird notes were incorporated in his "Catalogue of Canadian Birds", (1900-1904) and form a substantial basis for a list of the birds of Banff Park.

Additional published records are to be found in the Annual Reports of the Dominion Parks Branch, in which Mr. N. B. Sanson, Curator of the Banff Museum, included records of birds in his reports of museum activities and frequently inserted phenological notes in his meteorological reports. For several years Mr. Sanson also contributed information on bird migration to the U.S. Bureau of Biological Survey (now the U.S. Fish and Wildlife Service), which has kindly made these records available. A few notes derived from these annual returns have ben put on record by A. C. Bent in the series "Life Histories of North American Birds" published by the Smithsonian Institution, and by H. C. Oberholser in the series on migration of birds that was a regular feature of the magazine "Bird-Lore". The Parks Branch also published in 1914 a "Handbook of the Rocky Mountains Park Museum", by Harlan I. Smith, which records the specimens on exhibition at that time, including many from Banff. In addition it contains many notes on the local status of various species, undoubtedly contributed by Mr. Sanson.

In addition to published records we have unpublished notes and records from all the sources conveniently available to us, including the material from the United States Fish and Wildlife Service already mentioned. There is a list of the birds of Sulphur Mountain by N. B. Sanson from the National Parks Bureau as well as a brief list made at Banff early in 1922 by Mr. J. A. Munro. We have also had available a list of Banff Museum exhibits dated February 24, 1925, giving data for each bird specimen. On June 11, 1943, Clarke went through the collections in Banff Museum and noted all specimens labelled as originating in Banff. In 1941 Clarke, with the kind permission of Mr. P. A. Taverner, likewise searched the records of the National Museum of Canada for Banff specimens. He examined the lists of known Banff collections and checked some specimens. He did not search either the entire museum catalogue or the collection, so that there may be a small number of specimens in the National Museum still unrecorded. Similarly, occasional Banff specimens have made their way to other institutions. Although a few records of these have been obtained, no search has been made for others. A few of the specimens noted may not now be in existence, but all were authenticated at some time.

For information on abundance, (except for

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[1] —Received for publication June 9, 1944.

the notes in Macoun's Catalogue) and on the numbers and distribution of birds in the park at large rather than just around Banff town, we have depended largely on our own records. Our field trips have covered all parts of the park and various seasons of the year, with emphasis on spring and summer. In 1930 Cowan spent seven weeks in summer in the park collecting mammals for the National Museum of Canada. Clarke spent two weeks in the Yaha Tinda Ranch area, at that time in the Park, during the same summer, and during the remainder of the summer he was working on the east slope. In 1939 Clarke visited all parts of the park during June, July and August. In 1941 he spent a week in February and a week in April in the Bow Valley. In 1943 he spent a few days in June and two days in September at Banff, making several field excursions, while Cowan visited all parts of the park during April, June, July, August and September. Part only of each of these months was spent in Banff Park.

Yaha Tinda Ranch is located on the Red Deer River just east of Banff Park, and is an extensive intramontane prairie owned by the Dominion Government and operated as a horse ranch. While not formally included in Banff Park, it is the seat of a park warden establishment and is in many respects run as though it were part of the park. It is an especially interesting area for birds, and some records from it are included here, care being taken to distinguish them from park records. It is in the mountains, yet shares most of the east slope fauna.

Banff Park contains no unique birds, nor is it of crucial importance in the preservation or restoration of any rare or vanishing species. So far as is known, there is nothing unusual in the pattern of bird life woven from day to day in its varied fabric. It is in the character of this same fabric that the interest of the bird life lies. The three major plant formations of Canada — Grassland, Forest and Tundra — are all represented in Banff Park, each with its characteristic bird life. In addition the park is the meeting place of three major forest subdivisions, Boreal, Subalpine and Montane (cf. Halliday, W.E.D., 1937, "A Forest Classification for Canada" Dom. Forest Service, Bull. 89). Each of these has characteristic species in addition to many species that are shared. When one stops to think that within each of these major zones a great range of edaphic types is found, resulting from variations in topography, drainage, substratum and ecological history, then one realizes that the avifauna of Banff National Park cannot be other than rich and varied, and that the park presents opportunities for unusual occurrences. The record that follows amply fulfills these expectations, but there are obviously many additions yet to be made. Though the birds of the park were not a primary cause for its establishment as such, they are a splendid attraction, and the adequacy of the park area with respect to the representative character and completeness of its avifauna is important in confirming its value as a nature monument.

In preparing this list we have assembled all available records of all species of birds. It is obviously unnecessary to publish these records in their entirety. Instead they are used as the basis for generalizations on the status of the various species. Only when records are few are all given. Birds for which the expression "resident" is used are all known to inhabit the park throughout the year. Those designated "summer visitants" occur during the normal breeding season for their species. Other birds are "transients" and the seasonal status is indicated in each case. Actual evidence of breeding and dates of migration are given where available.

Whenever the local distribution is clearly limited to certain major vegetational subdivisions this is expressed. The Tundra formation is found above timberline on most of the mountains of the park. The Forest formation is widely distributed. The Grassland formation is represented by small patches of true Grassland in the Bow, Red Deer and Clearwater Valleys and by numerous patches of semi-grassland in these and many other valleys. Some of the open country at high altitudes partakes of the characteristics of both Grassland and Tundra. The Yaha Tinda Ranch is true Grassland. At the time the park was established the Bow Valley had many more Grassland areas than it has now.

The Forest Formation, as we have stated, is separable into three divisions or regions. The Montane forest, of which Douglas fir is the characteristic species on the east slope, just enters the park in the Bow Valley. It includes Stony Squaw and Tunnel Mountains and the shores of Lake Minnewanka, as well as the Bow Valley below Banff. In this list there are many species recorded only from the vicinity of Banff town. In certain instances they must be looked upon as representing the Montane forest, which stretches south of the park to the United States boundary. In the Banff region the Montane forest has reached its northern limit and contains few biotic elements differing from those of the Northern Coniferous forest. The remainder of the forest area is divided between the Subalpine forest and the Northern Coniferous (Boreal) forest. The dividing line between Engelmann spruce (*Picea Engelmanni*) and white spruce (*Picea glauca*) may be used to separate the two regions. In Banff Park white spruce extends in tongues up all the main valleys. It extends up the Spray to the upper falls, up the Bow to about Eldon, up the Red Deer to beyond Scotch Camp, up the Clearwater to the vicinity of the first "lakes", and up the North Saskatchewan to the forks. West of these points the valleys are occupied by Engelmann spruce. If these points in the valleys are joined by a north-south line it will be found that the whole area west of the line is Subalpine forest. Eastward the valleys and lower slopes and also dry sites at higher elevations have white spruce, where they have spruce at all. Moist sites at high elevations have Engelmann spruce and there is a considerable area of hybridization. On the whole, forest conditions are such that the eastern portion of the park is predominantly Northern Coniferous forest but a north-south line joining the easternmost elements of the Subalpine forest (moist areas at high elevation) would approximate the eastern boundary of the park. A large proportion of the forest area of the park is occupied by stands of lodge-pole pine (*Pinus contorta*), a temporary fire type running through all forest divisions and not diagnostic of any.

It should be added that the boundaries of forest Regions in Halliday (loc. cit.) do not agree in detail with the above statements. The changes involved have been discussed with Halliday and are acceptable to him.

Nearly all the migration records are from Sanson; we have been able to get a very few from other sources. All refer to Banff town and its environs.

In this list the presence of a north-south faunal boundary line approximating the eastern border of the park, but rather oftener inside than out, is clearly shown. There are some 50 species in this list that favour the eastern border of the park and this does not include some transients. Most of them just squeeze in; some are included because they are on the border, but not quite in. Most of them are abundant a short distance east. In addition we have records of at least ten species of the forest reserves of the east slope common within sight of the park, but not found in it. Inside the park there are some 25 species that are rare in or absent from the forest reserves outside its eastern border. The east slope belongs to northeastern Canada, Banff Park to the west. No considerations of altitude are involved in this, since easternmost and westernmost ranges alike rise above timberline, and the valleys are of comparable elevation. The real difference is in the precipitation, especially snowfall. The warm winds from the Pacific drop their moisture in the Rockies so that the west side is wet and the east dry. The north-south dividing line with respect to moisture is not the continental divide, however. It is the same as the faunal line that we have described.

## ANNOTATED LIST

**Common Loon.**

*Gavia immer.*— Summer visitant on many lakes. Lakes on which there are no loons presumably lack suitable food. Clarke saw no loons on Eagle Lake, near the Yaha Tinda Ranch, in 1930, but there was a pair in 1939. In the interim the lake had been stocked with fish.

We have no information that would justify classifying loons as harmful to sport fishing in Banff Park. In many lakes predation on certain superabundant age-classes or whole populations of fish can do no harm and might be beneficial. This and other aspects of the question of predation on fish by birds are dealt with in a recent paper by V. D. Vladykov (Can. Field-Nat. 57: 124-132, 1943).

Migration:- First seen, April 28, 1913; April 26, 1914.

**Red-necked Grebe.**

*Colymbus grisegena.*— From Sanson's records, which are the only ones available, it seems that the red-necked grebe occurs regularly on the Bow River in spring.

Migration:- First seen, April 28, 1913.

**Horned Grebe.**

*Colymbus auritus.*— Sanson's records show it to be a regular transient at Banff.

Migration:- First seen, April 29, 1913; May 2, 1914.

Specimens:- Banff Museum, 2, Banff, May 12, 1916, and October 10, 1923.

**Western Grebe.**

*Aechmophorus occidentalis.*— Taken at Banff on two occasions. Sanson noted also an injured young bird, October 17-19, 1912.

Migration.— First seen, May 7, 1913.

Specimens:- National Museum, 1, Banff, May 8, 1891; Banff Museum, 3; all at Banff, May 9, 1913, by Sanson.

**White Pelican.**

*Pelecanus erythrorhynchos.*— One was collected at Banff by the then Chief Warden H. E. Sibbald, on October 14, 1914, and is now in Banff Museum.

**American Bittern.**

*Botaurus lentiginosus.*— The bittern is known in the park only in the marshes near Banff, where it is a summer visitant.

Breeding:- Established by eggs collected by Sanson.

Migration:- First seen, June 17, 1912; May 26, 1913.

Specimens:- National Museum, 1, taken at Banff by Spreadborough; Banff Museum, 2, both at Banff by Sanson, May 26, 1913, also 3 eggs from a nest of 5 eggs at Banff, June 27, 1911, by Sanson.

**Trumpeter Swan.**

*Cygnus buccinator.*— Swans of undetermined species occasionally rest on Vermilion Lakes and other waters in migration. The only specific identification available is of a trumpeter swan seen at close range by Cowan on the Vermilion Lakes on June 8, 1943.

**Canada Goose.**

*Branta canadensis.*- Migrating Canada geese make regular stops along the Bow and North Saskatchewan Rivers, and probably also at other places, especially lakes. A few of them stay to nest.

Breeding:- Nesting in 1891 near Banff according to Macoun, and reported nesting by Sanson. Cowan saw 3 adults with 9 goslings in natal plumage near the Castle bridge on June 30, 1943. Nestings are evidently not as common now as formerly.

Migration:- Years recorded, 8; average date of arrival, April 9; earliest date of arrival, March 31, 1914. Departure was recorded for 1912, the last date of record being October 14. Flocks are recorded in spring as late as June 1, 1903, June 2, 1939, and June 13, 1943.

**Snow Goose.**

*Chen hyperborea.*— A solitary snow goose was observed by Clarke on Vermilion Lakes on June 13, 1943. It was with some Canada geese.

**Mallard Duck**

*Anas platyrhynchos.*— Mallards are summer visitants throughout the park, but they are common only in the Bow River flats near Banff. At Bow Falls and in other places where there is open water and food they stay all winter.

Breeding.- Cowan saw a female with 8 newly hatched ducklings at Graveyard, June 8, 1943.

**Baldpate.**

*Mareca americana.*— Summer visitant in the vicinity of Banff and possibly elsewhere.

Migration:- First seen, April 29, 1913; April 21, 1921.

Specimens:- Banff Museum, 1, at Banff, April 21, 1921, by Sanson.

**Pintail.**

*Dafila acuta.*— Probably a summer visitant, although we have only a doubtful record for Waterfowl Lakes, July, 1939. Its presence in autumn is attested by a specimen and Clarke saw 1 on February 25, 1941, with the mallards below Bow Falls.

Specimens:- Banff Museum, 1, Banff, September 28, 1923, by Sanson.

**Green-winged Teal.**

*Nettion carolinense.*— Recorded by Macoun as breeding on Vermilion Lakes in May, 1891. Recent records are lacking, but a close search would probably reveal its presence in the same place.

**Shoveller.**

*Spatula clypeata.*— Macoun records the shoveller as breedng at Vermilion Lakes ("a few pairs") in May, 1891. Sanson called it rare in 1913. Recent records are lacking, but it is probable that the shovellers are still present.

Migration:- First seen, April 28, 1913.

Specmens:- Banff Museum. 1; Banff, May, 1918, by Sanson.

**Canvas-back.**

*Nyroca valisineria.*— All our records are from Sanson, who called this species rare.

Migration:- First seen, April 26, 1911; April 16, 1912; April 16, 1916. Last seen, October 11, 1912.

Specimens:- Banff Museum, 1, Banff, April 16, 1916, by Sanson.

**Common Golden-eye.**

*Glaucionetta clangula.*— This golden-eye seems to be a transient and a winter visitant at Banff, the only place for which we have records. Summer golden-eyes so far recorded are all Barrow golden-eye. Clarke saw 2 below Bow Falls on February 25, 1941.

Specimens:- Banff Museum, 3, Banff, April 19, 1920, and May 3, 1920, both by Sanson, and a study skin, Banff, April 19, 1920, probably by Sanson.

**Barrow Golden eye.**

*Glaucionetta islandica.*— This species is widely distributed in the park as a summer visitant. Females and broods are seen in the summer, but males are in evidence only in spring. Bent gives Banff as a breeding station (Life Histories of N. A. Wild Fowl, 1925; Bull. 130, U.S. Nat. Museum).

**Buffle-head.**

*Charitonetta albeola.*— Recorded regularly by Sanson as a transient at Banff. It is said to occur in May and June, but Sanson's records seem to indicate that it does not stay around after the end of April.

Migration:- Years recorded, 5; Average arrival date, April 15; Earliest arrival date, March 24, 1914. For autumn, November 8, 1912, is recorded as the latest date of observation for that year.

Specimens:- Banff Museum, 4, Banff, April 27, 1906 (one), and April 30, 1908 (three). Sanson's annual report also records the collection of a specimen in 1909-10.

**Old Squaw.**

*Clangula hyemalis.*— Recorded only on May 1, 1916, when 4 specimens, all now in Banff Museum, were collected by Sanson.

**Harlequin Duck.**

*Histrionicus histrionicus.*— Summer visitant on rapid streams throughout the park. Cowan, watched a female feeding on aquatic insects and pond snails in the beaver pond below the outlet of Sawback Lake for half an hour on July 2, 1943. He hoped to see her return to her nest, which was probably close by, but she eluded him in the gathering dusk.

Specimens:- National Museum of Canada, 1, taken at Banff by Spreadborough; Banff Museum 1, collected by Sanson, May 19, 1924.

**White-winged Scoter.**

*Melanitta deglandi.*— Recorded by Sanson as observed on May 23, 1911, on the Bow River.

**Ruddy Duck.**

*Erismatura jamaicensis.*— Observed at Banff by Sanson on May 5, 1908.

**Hooded Merganser.**

*Lophodytes cucullatus.*— Macoun considered the hooded merganser to be breeding at Banff in May, 1891. Later records are lacking.

Specimens:- National Museum of Canada, 1, collected by Spreadborough at Banff in 1891.

**Common Merganser.**

*Mergus merganser.*— Widely distributed summer visitant.

Breeding:- Banff, reported by Macoun; Banff, female and 8 young observed by Clarke, June 3, 1939; Lake Minnewanka, brood observed by Clarke, August 17, 1939.

**Turkey Vulture.**

*Cathartes aura.*— One seen at Banff, in 1891 (Macoun).

**American Goshawk.**

*Astur atricapillus.*— Summer visitant, probably with considerable fluctuations in numbers. Cowan found it at three widely separated localities in 1943. Clarke saw none in 1939.

Breeding:- Cowan found a pair nesting near Little Pipestone Cabin on July 18, 1943. The young were calling loudly for food.

Specimens:- Banff Museum, 1, Banff Hot Springs, November 29, 1923.

**Sharp-shinned Hawk.**

*Accipiter velox.*— Well distributed summer visitant in the park. Macoun called it common in 1891, but this could scarcely apply today, except on certain days during the autumn migration. The east side of the Rockies is a recognizable flyway for bird migration and on some days in August and September hawks of various species are much in evidence. Cowan found, on June 3, 1943, near Banff, the wings and tail of a sharp-shin that had been eaten by an avian predator.

Migration:- First seen, April 17, 1909, and April 28, 1914.

Specimens:- Banff Museum, 4, Banff, November, 1904, April 29, 1908 or 1909, April 23, 1920, May 3, 1920.

**Cooper Hawk.**

*Accipiter cooperi.*— Summer visitant, widely distributed, but not at all common. The migration season brings no particular increase in the frequency with which this species is observed, undoubtedly because it is not far from its northern limits.

Specimens:- Fleming Collection (Royal Ontario Museum of Zoology), 1, Banff, April 25, 1896, recorded by Macoun; Banff Museum, 1, Banff, September 13, 1917.

**Red-tailed Hawk.**

*Buteo borealis.*— Summer visitant, fairly common. It is probably more common east of the park than within its boundaries.

Migration:- Observed April 28, 1943.

**Swainson Hawk.**

*Buteo swainsoni.*— Summer visitant, not common. Like the red-tail, it is commoner east of the park, and is seen regularly at the Yaha Tinda Ranch. There it has access to a favourite prey species, Richardson's ground squirrel.

Specimens:- Sanson records a specimen collected by Warden W. Peyto, 1913.

**Ferruginous Rough-leg.**

*Buteo regalis.*— There is a specimen in Banff Museum labelled as having come from Banff. It seems to be the specimen recorded by Smith as *B. lagopus.*

**Golden Eagle.**

*Aquila chrysaëtos.*— Resident, probably present through most of the year, but decidedly more common in summer. It is widely distributed and may be observed in most parts of the park by anyone equipped with good binoculars and willing to spend time scanning the alplands. Its favourite haunts are the vicinity of alpine colonies of the Columbian ground squirrel.

Eagle depredations on game are grossly exaggerated in the popular imagination. Bighorn lambs are vulnerable when new-born and have been carried off from the Banff animal paddock. However, Cowan noted that a flock of 4 goats containing a small yearling paid no attention to a circling eagle nearby. Clarke has observed sheep flock together, thereby causing an eagle to lose a previously apparent interest in them. Cowan also observed that hoary marmots in a rockslide below an eagle nest had shallow "funk holes" at many points on the narrow grassy meadow on the valley floor. These were burrows with two entrances, so short that when they were occupied the marmot could be seen from either end.

Breeding: - Cowan, in August, 1930 observed a nest on the south wall of the "Amphitheatre" on Cascade Mountain. The National Parks Bureau has a photograph, taken at Lake Louise, of a nest with young.

**Bald Eagle.**

*Haliaeetus leucocephalus.* - Resident through most of the year. Records are confined to the Bow Valley in the Banff area except for an adult seen by Cowan in the lower part of Fortymile Valley, August 21, 1930.

Specimens: - Smith records a juvenile specimen from Banff. Banff Museum has 1, Banff, March 16, 1918.

**Marsh Hawk.**

*Circus hudsonius.* - Summer visitant, widely distributed, but not common.

**Osprey.**

*Pandion haliaetus.* - Summer visitant, recorded only in the vicinity of Banff. In view of its restricted range in the park its occasional hatchery pond depredations may well be forgiven.

Breeding: - Macoun had information of a nest. Clarke was told that there was a nest at the mouth of Echo Creek for a number of years.

Migration: - First seen, April 29, 1908, April 23, 1911.

Specimens: - Macoun records one taken at Banff, June, 1893.

**Duck Hawk.**

*Falco peregrinus.* - Cowan saw a duck hawk at close range near Spray River Cabin on April 26, 1943.

**Pigeon Hawk.**

*Falco columbarius.* - Uncommon summer visitant. In 1939 Clarke saw one at Stony Creek and another at Yaha Tinda Ranch.

Specimens: - Banff Museum, 1, Banff, May 4, 1921.

**American Sparrow Hawk.**

*Falco sparverius.* - Fairly common summer visitant and abundant migrant.

Migration: - Years recorded, 4; average date of arrival, May 5; earliest date of arrival, April 25, 1943. In 1909 it was last seen September 22.

Specimens: - National Museum of Canada, 2, collected at Banff by Spreadborough in 1891.

**Dusky Grouse.**

*Dendragapus obscurus.* - Common throughout the park in suitable sites and resident throughout the year. The "blue" grouse prefers open slides and old burns, and does not like dense bush. It is found at the Yaha

Tinda Ranch but not in the foothills.

Breeding: - In Banff Museum there is an egg collected by Sanson at Banff. Clarke saw a female with young at Spray River, August 1, 1939. Cowan saw a female with 8 young at Yaha Tinda Ranch, July 7, 1943, and a female with 3 flying young above the Siffleur River, July 14, 1943.

Specimens: - Banff Museum, 3, Banff, April 25, 1904, by Sanson, February 13, 1917, and November 4, 1924.

**Spruce Grouse.**

*Canachites canadensis.* - Found only on the eastern borders of the park where it is a year round resident. In general the spruce grouse is the bird of the Northern Coniferous forest and Franklin grouse of the Subalpine forest. The region where the two forest types overlap seems to be occupied by Franklin grouse so that the spruce grouse is rather rare in the park. The two species are very similar and both are known as fool hen. In fact, the Zoological Museum at Cornell University contains three hybrids collected by Mr. James Simpson of Banff, one of which was taken in the park and two just outside.

Breeding:- Cowan found a nest at Indianhead, July 12, 1943, with 6 eggs, of which 4 had been broken and were scattered around the nest for 6 or 8 feet. Clarke saw a female with young at Spray River on August 1, 1939.

Specimens:- A Banff specimen was reported to be in the collection of the late Jonothan Dwight. The hybrid spruce grouse X Franklin grouse mentioned above was taken at Glacier Lake on August 2, 1908. We are indebted to Dr. A. A. Allen for information concerning this and other grouse specimens.

**Franklin Grouse.**

*Canachites franklini.*— Common year-round resident of much of the park. As already noted, this species occupies all the Subalpine Forest and also the area where the Subalpine and Northern Coniferous forests overlap. It shares with the spruce grouse the common name "fool hen". Grouse seen in thick bush are likely to be Franklin grouse.

Breeding:- Clarke was shown an incubating female on June 30, 1939, at Bow Summit. Broods of young were observed at Howse River, July 15, 1939 (6 young); Bryant Creek, July 23, 1939, and July 28, 1939.

Specimens:- Banff Museum, 1, Banff, May 23, 1923; Cornell University, 5 taken by James Simpson, including 2 at Pipestone Pass, September 15, 1909, 1 at Mistaya River, June 20, 1911, and 2 at Ptarmigan Valley, August 15-22, 1911.

**Ruffed Grouse.**

*Bonasa umbellus.*— Year-round resident of the eastern portion of the park, including the Montane and Northern Coniferous forests. It is periodically common at Banff. This and other grouse fluctuate in numbers and, during a period of scarcity, species that are not well distributed may be hard to find.

Specimens:- Banff Museum, 1, Banff, December 13, 1912.

**White-tailed Ptarmigan.**

*Lagopus leucurus.*— Common year-round resident, found on all summits above timberline and descending into valleys in winter. It is one of the most characteristic mountain birds.

Breeding:- Macoun records a brood of young observed on Sulphur Mountain, September 1, 1897. Sanson, in his 1913 report, mentions a brood of 9 seen on Simpson Summit. Clarke saw newly-hatched young with their mother on Bow Summit, July 6, 1939.

Specimens:- Macoun records 2 from Banff, February 24, 1896. Sanson, in his 1913 report, states that 2 were collected by Warden Louis Mumford. Banff Museum has 5, all from Banff, including 2 collected January 14, 1914 and 2 March 18, 1914.

**Sharp-tailed Grouse.**

*Pedioecetes phasianellus.* - Sanson reports this species at Banff in the winter of 1913-14 and remarks that this was the first observation in years. It is found regularly on the Yaha Tinda prairie and apparently wanders up the Bow Valley into the park at irregular intervals.

**Gray Partridge.**

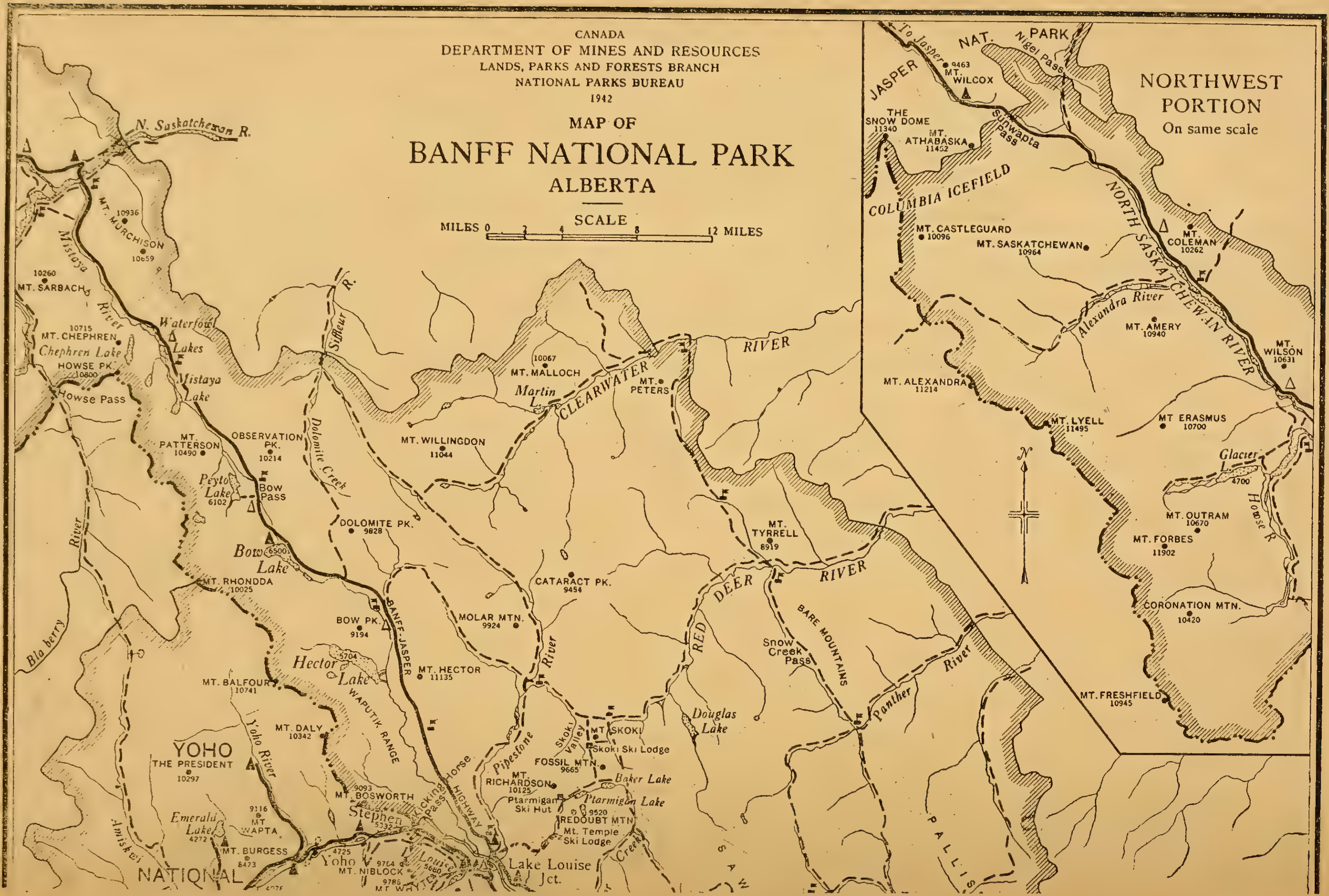
*Perdix perdix.* - This species (commonly called Hungarian partridge) has been reported at Banff and at Yaha Tinda Ranch, but has not established itself anywhere. The first obser-vaton was at Johnston Canyon (Annual Report 1920-21).

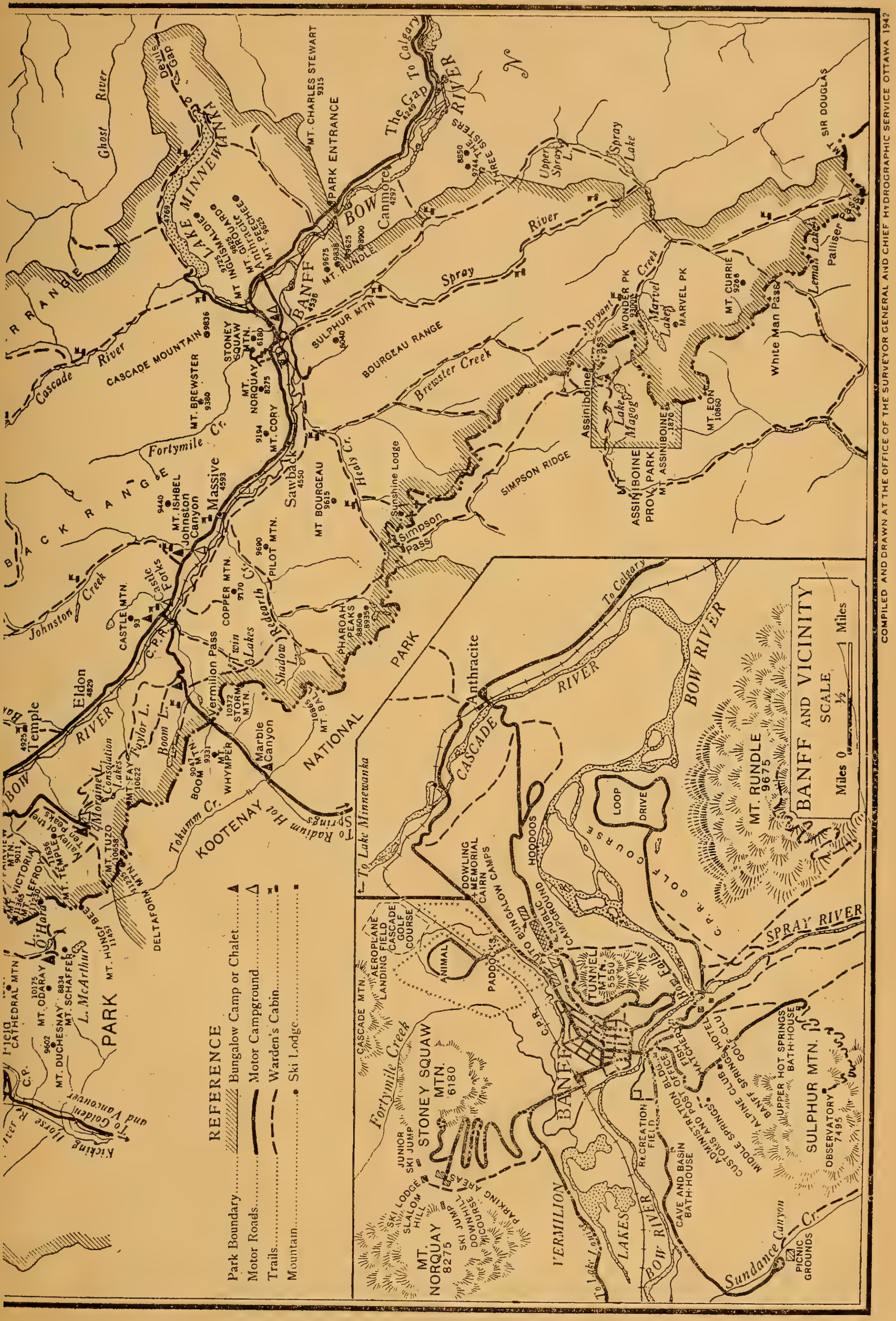
**Sora Rail.**

*Porzana carolina.* - Summer visitant found only at Banff, in the marshes of the Bow River flats.

Breeding: - Reported by Macoun.

Specimens: - Banff Museum, 2, Banff, July 15, 1891, presumably by Spreadborough and May 14, 1918 by Sanson.


CANADA
DEPARTMENT OF MINES AND RESOURCES
LANDS, PARKS AND FORESTS BRANCH
NATIONAL PARKS BUREAU
1942
MAP OF
BANFF NATIONAL PARK
ALBERTA
SCALE
MILES 0 2 4 8 12 MILES
NORTHWEST PORTION
On same scale
To Jasper
JASPER NAT. PARK
Nigel Pass
MT. WILCOX 9463
THE SNOW DOME 11340
MT. ATHABASKA 11452
Sunwapta Pass
COLUMBIA ICEFIELD
MT. CASTLEGUARD 10096
MT. SASKATCHEWAN 10964
NORTH SASKATCHEWAN RIVER
MT. COLEMAN 10262
Alexandra River
MT. AMERY 10940
MT. WILSON 10631
MT. ALEXANDRA 11214
MT. LYELL 11495
MT ERASMUS 10700
Glacier L. 4700
Howse R.
MT. OUTRAM 10670
MT. FORBES 11902
CORONATION MTN. 10420
MT. FRESHFIELD 10945
N
N. Saskatchewan R.
MT. MURCHISON 10936 10659
Mistaya River
MT. SARBACH 10260
Waterfowl Lakes
MT. CHEPHREN 10715
Chephren Lake
HOWSE PK. 10800
Howse Pass
Mistaya Lake
MT. PATTERSON 10490
OBSERVATION PK. 10214
Peyto Lake 6102
Bow Pass
Bow Lake 6500
MT. RHONDDA 10025
Siffleur R.
Dolomite Creek
DOLOMITE PK. 9828
MT. WILLINGDON 11044
MT. MALLOCH 10067
Martin L.
CLEARWATER RIVER
MT. PETERS
MT. TYRRELL 8919
RED DEER RIVER
BARE MOUNTAINS
Snow Creek Pass
Panther River
PALLISER
SAWBACK
CATARACT PK. 9454
MOLAR MTN. 9924
River
BOW PK. 9194
BANFF-JASPER HIGHWAY
MT. HECTOR 11135
Hector Lake 5704
WAPUTIK RANGE
MT. BALFOUR 10741
MT. DALY 10342
Blaeberry River
Amiskwi
YOHO NATIONAL
THE PRESIDENT 10297
Yoho River
Emerald Lake 4272
MT. WAPTA 9116
MT. BURGESS 8473
MT. BOSWORTH 9093
Stephen 5332
Kicking Horse Pass
Yoho 4725
MT. NIBLOCK 9764
MT. WHYTE 9786
Louise 5660
Lake Louise Jct.
Pipestone
Skoki Valley
MT. SKOKI
Skoki Ski Lodge
FOSSIL MTN. 9665
MT. RICHARDSON 10125
Baker Lake
Ptarmigan Lake
Ptarmigan Ski Hut
REDOUBT MTN. 9520
Mt. Temple Ski Lodge
Creek
Douglas Lake


REFERENCE
Park Boundary
Motor Roads
Trails
Mountain
Bungalow Camp or Chalet
Motor Campground
Warden's Cabin
Ski Lodge
BANFF AND VICINITY
SCALE
Miles 0 ½ 1 Miles
COMPILED AND DRAWN AT THE OFFICE OF THE SURVEYOR GENERAL AND CHIEF HYDROGRAPHIC SERVICE OTTAWA 1942
BANFF
LAKE MINNEWANKA
BOW RIVER
CASCADE MOUNTAIN
SULPHUR MTN
BOURGEAU RANGE
BACK RANGE
KOOTENAY NATIONAL PARK
MT. RUNDLE 9675
STONEY SQUAW MTN. 6180
MT. NORQUAY 8275
TUNNEL MTN. 5550
SPRAY RIVER
VERMILION LAKES
CASCADE RIVER
Anthracite
Canmore
Castle Mtn.
Johnston Canyon
Vermilion Pass
Marble Canyon
Simpson Pass
Sunshine Lodge
MT. ASSINIBOINE PROV. PARK
Lake Magog
Spray Lake
The Gap
PARK ENTRANCE
To Calgary
To Radium Hot Springs
To Golden and Vancouver
To Lake Minnewanka
To Lake Louise

**American Coot.**

*Fulica americana.* - Summer visitant found only in the Bow River marshes. Sanson considered it rare.

Breeding: - At Vermilion Lakes, May 11, 1891, according to Macoun.

Migration: - First seen, April 29, 1913.

Specimens: - Banff Museum, 2, 1 from Banff received from the Geological Survey of Canada in 1895 and 1 collected at Sawback, May 15, 1915, by Warden Chas. Phillips.

**Killdeer Plover.**

*Oxyechus vociferus.* —Summer visitant, widely distributed in the park.

Breeding: - Bent's "Life Histories of N.A. Shore Birds, Pt. 2" (U. S. Nat. Mus. Bull. 146, plate 33) has a photograph of a nest and eggs at Banff. On July 18, 1939, Clarke captured a recently hatched young bird at Graveyard..

**Wilson Snipe.**

*Capella delicata.* —Summer visitant, recorded only from the Bow River flats.

Specimens:- National Museum of Canada, 2, collected at Banff by Spreadborough; Banff Museum, 1, collected at Castle, October 14, 1915 by Warden William Fyfe.

**Upland Plover.**

*Bartramia longicauda.* — On July 15, 1943, at the head of the Siffleur River, Cowan saw a pair. Their actions were characteristic of birds on nesting territory.

**Spotted Sandpiper.**

*Actitis macularia.* — Common summer visitant throughout the park.

Breeding: - Clarke found a nest with 4 eggs at Peyto Lake, July 2, 1939.

Migration: - First seen, May 9, 1913.

Specimens:- National Museum of Canada, 1, collected at Banff by Spreadborough.

**Solitary Sandpiper.**

*Tringa solitaria.*— On the east slope, including the Yaha Tinda area, this species is a common summer visitant, but it does not enter the park except on the border. Our only record is one seen near the eastern gate in the Bow Valley by Clarke on August 19, 1939.

**Greater Yellow-legs.**

*Totanus melanoleucus.*— This species is, like the solitary sandpiper, a common summer visitant on the east slope, including the Yaha Tinda area. In the park our only record is one seen by Cowan, April 25, 1943, in the Bow Valley, 4 miles west of Banff.

**Dowitcher.**

*Limnodromus griseus.*— Spreadborough collected one at Banff in 1891, the specimen being now in the National Museum of Canada.

**Semipalmated Sandpiper.**

*Ereunetes pusillus.*— Spreadborough collected one at Banff in May, 1891, the specimen being now in the National Museum of Canada.

**Northern Phalarope.**

*Lobipes lobatus.*— Apparently this bird is a scarce but regular migrant in August. In addition to the August specimens listed, Clarke observed one on Lake Minnewanka on August 18, 1939.

Specimens:- Banff Museum, 1, August 9, 1911, by Sanson. In addition Macoun records the collection of 3 at Banff by Spreadborough, of which one is in the National Museum.

**California Gull.**

*Larus californicus.*— Gulls regularly wander into Banff Park, but the only specific identification that we have is of 2 California gulls feeding on fish offal at Lake Minnewanka, June 6, 1943, observed by Cowan.

**Mourning Dove.**

*Zenaidura macroura.*— Sanson records this species as rare at Banff. He observed it on May 23, 1909, and May 24, 1914. It is more common farther east. We saw none in the park but Clarke saw 3 at various times in June, 1939, at the Yaha Tinda Ranch.

**Great Horned Owl.**

*Bubo virginianus.*— Year-round resident, well distributed in the park. Its numbers probably fluctuate considerably but it could hardly be called common.

Specimens:— Banff Museum, 2, Banff, February 26, 1915, by Warden Walter Peyto, and March 17, 1917.

**Hawk Owl.**

*Surnia ulula.*— Macoun records one at Laggan (Lake Louise) on July 20, 1885. In his 1913 report Sanson mentions the discovery of a nest during a trip to Simpson Pass.

**Pygmy Owl.**

*Glaucidium gnoma.*— Fairly common resident in all parts of the park, present throughout the year, but more frequently reported in winter.

Specimens:- Banff Museum, 4, including 1 from Banff, February 21, 1919, by Warden Walter Peyto, 1 from Castle, February 20, 1915, by Warden Wm. Fyfe, 1 from Banff, November 14, 1914, and an undated study skin from Banff.

**Little Boreal Owl.**

*Cryptoglaux funerea.*— Seldom observed, but possibly a well distributed year-round resident although all available records are for fall and winter. At present it is known from specimens and from a fine photograph taken at Banff, October 2, 1923, by Eric Hearle, published in A. C. Bent's "Life Histories of N. A. Birds of Prey, Pt. 2" (U.S. Nat. Museum Bull. 170, 1938).

Specimens:- Banff Museum, 3, Banff, November 3, 1913, by Warden Wm. Fyfe, January 27, 1922, by Warden W. Peyto and February 4, 1918.

**Nighthawk.**

*Chordeiles minor.*— Summer visitant, well distributed.

Breeding:- Reported by Macoun. Clarke found a nest with 2 eggs at Banff on July 20, 1939.

Migration:- First seen, May 28, 1909, and June 3, 1913. Last seen September 7, 1909.

Specimens:- National Museum of Canada, 1, collected by Spreadborough; Banff Museum, 1, August 21, 1939 (killed by flying into the glass windows of the swimming pool at the Cave and Basin).

**Black Swift.**

*Nephoecetes niger.*— Rare summer visitant. A. C. Bent's "Life Histories of North American Cuckoos, etc." (Bull. 176, U.S. Nat. Museum, 1940) records the discovery of a nest at Johnston Canyon by Clarence E. Chapman, September 2, 1919. The only other record is of a pair seen by Clarke at Lake Louise on June 29, 1939.

**Rufous Hummingbird.**

*Selasphorus rufus.*— An abundant summer visitant, well distributed in the park. In early June it frequents Caragana hedges within the town of Banff. On the evening of June 11, 1943, Clarke saw ten males, spaced at regular intervals around Tunnel Mountain, all performing their courtship flight.

Breeding:- Macoun records it as nesting in spruce trees at Banff.

Migration:- Years recorded, 3; average date of arrival, June 1; earliest date of arrival, May 29, 1903.

Specimens:- National Museum of Canada, 1, collected at Banff by Spreadborough; Banff Museum, 1, killed by flying into the glass at the Cave and Basin, May 25, 1923.

**Calliope Hummingbird.**

*Stellula calliope.*— Our only records are from Macoun, who reported it breeding at Banff in considerable numbers in 1891. Two specimens collected then are in the National Museum of Canada.

**Belted Kingfisher.**

*Megaceryle alcyon.*— Summer visitant, common at Banff, and on the Spray River, but not recorded elsewhere up to the present.

Migration: - Years recorded, 5; average date of arrival, May 6, earliest date of arrival, April 25, 1908; last seen, September 30, 1909 and September 11, 1912.

Specimens:- National Museum of Canada, 1, taken at Banff by Spreadborough in 1891; Banff Museum, 5, all from Banff, including 1 each on September 4, 1917, June 19, 1920, and August 27, 1919, and 2 study skins.

**Yellow-shafted Flicker.**

*Colaptes auratus.*— There are two species of flicker in Canada, the yellow-shafted, of eastern-distribution and the red-shafted of western-distribution. They meet as summer visitants in Banff Park, and hybridize freely along the line of meeting. Generally stated, the yellow-shafted flicker is the bird of the Northern Coniferous forest and the red-shafted flicker of the other forest divisions. The zone of hybridizaton goes clear across the park but most of the birds seen in the field may be arbitrarily identified by means of wing colour, disregarding other characters and we have done so whenever we could. On this basis few yellow-winged birds will be seen in the park, though Clarke saw one in 1939 at Palliser Pass on the British Columbia border. Birds seen at the Yaha Tinda Ranch are yellow-shafted.

Breeding: - Said by Macoun to breed at Banff. Undoubtedly flickers of some sort nest throughout the park.

Migration: - Sanson's records are for "flickers" unspecified, and are given under the next species.

Specimens: - Spreadborough took 5 flickers, three of which Macoun calls yellow-shafts. Preble (North Amer. Fauna No. 27, 1908) records a hybrid specimen from Banff.

**Red-shafted Flicker.**

*Colaptes cafer.* — Most of the flickers seen in Banff Park may be referred arbitrarily in the field to this species, though it is probable that many would, in the hand, show signs of hybridization with the preceding species. The red-shaft is abundant and widespread.

Breeding: - Breeding at Lake Minnewanka in 1891, according to Macoun. As already stated, flickers of some sort are residents in summer throughout the park.

Migration: - Sanson's "flicker" records are placed under this species because it is so much more common than the preceding. Years recorded, 4; average date of arrival, April 15, earliest date of arrival, April 3, 1912.

Specimens:- Macoun identifies 1 of Spreadborough's Banff specimens as a red-shaft.

**Pileated Woodpecker.**

*Ceophloeus pileatus.*— Recorded only near Banff where it is a year-round resident, not common.

Breeding:- Cowan observed a pair excavating a nest cavity in a large live aspen tree by the roadside 6 miles west of Banff, April 24, 1943. There were two old cavities in the same tree.

**Lewis Woodpecker.**

*Asyndesmus lewisi.*— The Banff Museum list records a specimen from Hayfield Park near Banff, 1896, presented by N. B. Sanson.

**Yellow-bellied Sapsucker.**

*Sphyrapicus varius.*— Collected at Banff (1 specimen in the National Museum) by Spreadborough in 1891.

**Hairy Woodpecker.**

*Dryobates villosus.*— A well distributed year-round resident, not generally common. It is probable that there are more in the Bow River flats than elsewhere.

**Downy Woodpecker.**

*Dryobates pubescens.*— Year-round resident, probably well distributed, but so far our records are all from Banff town. It is certainly not generally common.

Specimens:- Macoun states that specimens were taken in August, 1891. One is now in the National Museum of Canada.

**Arctic Three-toed Woodpecker.**

*Picoides arcticus.*— Probably a year-round resident. It might put in an appearance anywhere in the park, but so far all we have are a few records for Banff town.

Specimens:- Banff Museum has a specimen collected in 1891, presumably by Spreadborough.

**American Three-toed Woodpecker.**

*Picoides tridactylus.*— Abundant and widespread year-round resident.

Breeding:- Reported by Macoun. Clarke saw a brood just out of the nest at Bow Summit on July 19, 1939.

Specimens:- Banff Museum, 2, Banff, June 8, 1891, and June 10, 1891, presumably by Spreadborough.

**Eastern Kingbird.**

*Tyrannus tyrannus.*— Summer visitant, to be expected only along the eastern border of the park. At Yaha Tinda Ranch and eastward it is common. At Banff it is fairly regular.

Migration:— First seen May 24, 1908, and May 26, 1909.

Specimens:- Spreadborough collected 2 in 1891, both now in the National Museum of Canada.

**Say Phoebe.**

*Sayornis saya.*— Macoun reports a pair seen at Banff in 1891.

**Traill Flycatcher.**

*Empidonax trailli.*— Common along the lower Bow River and to be expected elsewhere on the eastern fringes of the park. It is associated with the Northern Coniferous forest region, although not with the actual forest. At Yaha Tinda Ranch and eastward it is a common summer visitant.

Specimens:- Two, now in the National Museum of Canada, taken by Spreadborough in 1891.

**Hammond Flycatcher.**

*Empidonax hammondi.* —Clarke observed one at Banff on June 12, 1943. In A. C. Bent's "Life Histories of N. A. Flycatchers, etc." (U. S. Nat. Mus. Bull. 179, 1942) the date "Banff, May 12" is given in the paragraph on the spring migration of this species. It is evidently a rare summer visitant in the park, so far known only from Banff.

**Wright Flycatcher.**

*Empidonax wrighti.* — Common summer visitant in old burns and open places throughout the park. Macoun found it also at Canmore, east of Banff, but it is not a bird of the east slope.

Migration:- Bent '(op. cit. under previous species) gives "Banff, May 20".

Specimens:- We have record of five. Three, in the National Museum of Canada, were taken at Banff by Spreadborough. There is one from Banff in the Fleming collection (Royal Ontario Museum of Zoology). One, collected by Clarke, July 21, 1939, at Spray River Cabin, is in the National Museum of Canada.

**Richardson Pewee.**

*Myiochanes richardsoni.*— Summer visitant. It is most often found in or near Banff town, but is not common. It has been found at widely separated places on the eastern side of the park, at Yaha Tinda Ranch and eastward, and is associated with the Montane and Northern Coniferous forests.

Specimens:- National Museum of Canada, 1, collected in 1891, by Spreadborough; Banff Museum, 2, August 21, 1906, and May 6, 1939, both by Sanson.

**Olive-sided Flycatcher.**

*Nuttallornis mesoleucus.*— Common summer visitant, found throughout the park.

Specimens:- National Museum of Canada, 3, collected by Spreadborough in 1891.

**Horned Lark.**

*Otocoris alpestris.*— Common as a transient, much less so as a summer visitant. Its presence in summer and behaviour at Dormer, Pipestone, and Molar Passes suggest that it breeds at these and other places above timberline. There is also an interesting possibility that it may nest lower down in the same region, on the Yaha Tinda Prairie.

Migration:- Clarke saw large flocks at the Yaha Tinda Ranch and Scotch Camp as late as June 16, 1939.

**Violet-green Swallow.**

*Tachycineta thalassina.*— Common summer visitant at Banff and Lake Louise and observed also at Waterfowl Lakes.

Migration:— First seen April 18, 1941.

**Tree Swallow.**

*Iridoprocne bicolor.*- Apart from the specimens below we had no personal record of this species until 1943, although it had been noted by Sanson. In 1943 there were a number around Banff town and also at Lake Minnewanka. Their presence had no observable effect on the violet-green swallows. Evidently the tree swallow is an erratic summer visitant on the eastern borders of the park. It occurs regularly on the east slope, and the violet-green swallow overlaps it there.

Specimens:- Two Banff specimens were received in the flesh by Munro.

**Bank Swallow.**

*Riparia riparia.*— Common summer visitant on the Bow River below Banff. Macoun reported it for 1891, but Spreadborough's specimen is from Canmore. In 1943 Cowan found it in numbers near Banff. We have no records elsewhere in the park.

Breeding.- Nesting abundantly in 1943 in cut-banks along the Bow River below Banff.

Migration:- Arrival at Banff on June 2, 1943, was observed by Cowan. A flock of 302 birds spent almost the entire day asleep on wires near the Banff Avenue bridge.

**Rough-winged Swallow.**

*Stelgidopteryx ruficollis.*— In 1939 Clarke found a colony nesting in the river bank at the North Saskatchewan bridge. Macoun reports it breeding at Canmore in 1891 and it has undoubtedly visited the park in that sector.

**Barn Swallow.**

*Hirundo erythrogaster.*— Macoun found it common and breeding at Banff in 1891. We have no other records.

Specimens:- One, collected by Spreadborough, is in the National Museum of Canada.

**Cliff Swallow.**

*Petrochelidon albifrons.*— Common summer visitant, especially numerous at Banff, but well distributed through the park.

Breeding:- Nests abundantly, particularly at Banff. A large colony on Banff Public School produced such an infestation of bugs (*Cimex*) that it was necessary to remove the nests.

Migration:- First seen May 8, 1909, and May 17, 1914; last seen September 3, 1912. On June 6, 1943, at an elevation of 6200 feet, near the head of Carrot Creek, Cowan saw 6 of these birds fly rapidly northward through a driving snowstorm.

Specimens:- Banff Museum, 1, taken June 19, 1891, presumably by Spreadborough.

**Canada Jay.**

*Perisoreus canadensis.*— Abundant year-round resident, found throughout the park.

Breeding:- It nests in late winter and early spring and during that season sings melodiously. On April 28, 1914, Sanson caught a young bird out of the nest. On March 25, 1911, he records nest-building on Sulphur Mountain.

Specimens:- National Museum of Canada, 1, taken in 1891; Banff Museum, 3, including 1, presumably taken by Spreadborough in 1891, received from Ottawa, and 2 by Sanson, February 17, 1922, and April, 1931.

**Steller Jay.**

*Cyanocitta stelleri.*— Information from park wardens shows that the "blue jay" is a regular winter visitant. According to Warden Woodworth, one spent the winter of 1940-41 at Lake Louise. Sanson records it on March 12, 1913, and April 8, 1908, at Banff, and informed Clarke that he had "seen them in the park in winter".

**Magpie.**

*Pica pica.*— Macoun reported the magpie to be "occasional at Banff in winter" in 1891. The extension of human establishments and artificial conditions since then has permitted it to become a common year-round resident in the Bow Valley. It is also found at the Yaha Tinda Ranch and Cowan saw a bird in 1943 at Divide Creek.

Specimens:- Banff Museum, 2, collected at Sawback, December 11, 1914, by H. E. Sibbald.

**Raven.**

*Corvus corax.*— Macoun reported that a raven was seen in the park in the summer of 1891, and Banff Museum has a specimen from Massive, collected by Warden C. V. Phillips, February 28, 1917.

**American Crow.**

*Corvus brachyrhynchos.*— Macoun's party observed no crows at Banff in 1891. Since that time the crow has become a common summer visitant in the Bow Valley. Moreover, Cowan saw one at Spray River Cabin, June 11, 1943. Clarke observed it also at the North Saskatchewan bridge in 1939, and on June 8, 1943, Cowan saw 12 at Graveyard. It is common at the Yaha Tinda Ranch.

Breeding:- It nests where found. Cowan saw a pair feeding nestling young at Lake Minnewanka on June 6, 1943.

Migration:- When suitable weather conditions prevail, crows stay all winter.

**Clark Nutcracker.**

*Nucifraga columbiana.*— Common year-round resident. In the park at large it is found at higher altitudes, in the Subalpine forest, and not at lower levels, or along the eastern border. However, it makes an exception to this rule in favour of the town of Banff. There it is common and lives as a scavenger.

Breeding:- Sanson records one building a nest at Banff, April 12, 1908. Cowan saw three pairs feeding young in Banff, June, 1943.

Specimens:- Banff Museum, 2, Hot Springs, February 17, 1922, by N. B. Sanson.

**Black-capped Chickadee.**

*Penthestes atricapillus.*— Year-round resident, fairly common and widely distributed, especially on the eastern side of the park.

Specimens:- National Museum of Canada, 1, collected in 1891; Banff Museum, 1, Banff, November 15, 1919, by Sanson.

**Gambel Chickadee.**

*Penthestes gambeli.*— Fairly common year-round resident, widely distributed in the park, especially on the western side and at higher altitudes.

Specimens:- Macoun records 5 taken in May, 1891.

**Brown-headed Chickadee.**

*Penthestes hudsonicus.*— Abundant year-round resident in all parts of the park.

Specimens:- Preble (N. A. Fauna No. 27, 1908) records 2 taken at Banff in August, 1894, by J. Alden Loring.

**Chestnut-backed Chickadee.**

*Penthestes rufescens.*— Recorded at Seebe, near the park, on November 12, 1939, by R. D. Ussher (Can. Field-Nat. 54: 75, 1940). This western bird may well have gone through the park in order to get to Seebe.

**Red-breasted Nuthatch.**

*Sitta canadensis.*— Common year-round resident in all parts of the park.

Specimens:- National Museum of Canada, 3, taken in June, 1891; Banff Museum, 2, both from Banff, of which 1 was received from Ottawa and the other collected October 10, 1906, by Sanson. Preble (N. A. Fauna, No. 27, 1908) records a male, Banff, August 31, 1894, collected by Loring.

**Brown Creeper.**

*Certhia familiaris.*— Widely distributed, probably, on the basis of February records, a a year-round resident, of which rather few observations are available. It seems thoroughly at home in summer at Bow Summit in dense Subalpine forest, but is recorded for other forest sections as well.

**American Dipper.**

*Cinclus mexicanus.*— Common year-round resident on streams throughout the park and on the east slope as well. Cowan considered the 1943 Carrot Creek population to be one bird per mile.

Breeding:- Nests are usually built behind or near waterfalls. A nest in Banff Museum was found at Johnston Creek and presented by Tex Wood.

Specimens:- Banff Museum, 1, Vermilion (Third) Lake, February 15, 1922, by Sanson.

**House Wren.**

*Troglodytes aëdon.*— Macoun reported it rare at Banff in June, 1891. We have other records from near the park, including one within a stone's throw of the border in Howse Pass, but none inside.

**Winter Wren.**

*Nannus hiemalis.*— Summer visitant of the Subalpine forest area. We have records for Healy Creek, Wigmore Creek, and Boom Creek (Cowan 1943) and Peyto Lake (Clarke 1939).

**American Robin.**

*Turdus migratorius.*— Abundant summer vistant, found from timber-line to valley bottom throughout the park.

Breeding:- On June 2, 1943, Cowan found a nest with 4 eggs in a small spruce growing in the middle of Boom Creek. At the time there were few patches of bare ground showing through the snow. Banff Museum has an egg and 2 nests collected by Sanson. Sanson records a nest reported to him at Banff, on March 24, 1908. Young were flying on June 2, 1914.

Migration:- Years recorded, 8; average date of arrival, March 18; earliest date of arrival, March 3, 1913; last seen, October 4, 1909, and September 17, 1912.

Specimens:- Banff Museum, 3, all from Banff, including 1 received from Sanson in 1906, 1 taken June 3, 1914, by Sanson, and a study skin, May 15, 1916; National Museum of Canada, 1, collected, 1891, by Spreadborough.

**Varied Thrush.**

*Ixoreus naevius.*— Summer visitant widely distributed but not generally common. We have records for Banff, Bow Summit, Palliser Pass, and Boom Lake. In thick Subalpine forest it is thoroughly at home.

Migration:- First seen, March 12, 1908, and March 28, 1912.

**Hermit Thrush.**

*Hylocichla guttata.*— Common summer visitant in all parts of the park.

Breeding:- Cowan saw a nest with 4 partially feathered young at Sawback Lake, July 2, 1943.

Specimens:- National Museum of Canada, 1, Banff, 1891; Banff Museum, 3, all from Banff, including 1 taken May 24, 1916, by Sanson, and 1 found dead at the Spray River, June 10, 1939.

**Olive-backed Thrush.**

*Hylocichla ustulata.*— Common summer visitant at lower altitudes in all parts of the park.

Migration:- Years recorded, 6; average date of arrival, May 22; earliest date of arrival, May 20, 1908.

Specimens:- National Museum of Canada, 2, by Spreadborough, 1891; Banff Museum, 5, all from Banff, including June 15, 1891, June 5, 1918, and June 7, 1919. Preble (N.A. Fauna, No. 27, 1908) records 1 taken at Banff, August 29, 1894, by J. Alden Loring.

**Grey-cheeked Thrush.**

*Hylocichla minima.*— Common at high altitudes and evidently fairly well distributed. Where it occurs it more or less replaces the olive-backed thrush.

Specimens:- Banff Museum contains 1 (No. 14) received from N. B. Sanson. Cowan collected 1 at the head of Brewster Creek, June 9, 1943. A specimen collected June 9, 1939, by Clarke at the Yaha Tinda Ranch is in the National Museum of Canada.

**Wilson Thrush.**

*Hylocichla fuscescens.* — Macoun records one pair observed at Banff in the summer of 1891.

**Mountain Bluebird.**

*Sialia currucoides.*— Common summer visitant throughout the park.

Migration:- Number of years recorded, 11; average date of arrival, March 26; earliest date of arrival, February 16, 1914. In spite of its early arrival, birds that are obviously migrating northward may be seen early in June.

Specimens:- National Museum of Canada, 6, collected by Spreadborough, at Banff in 1891; Banff Museum, 2, both taken at Banff by Sanson, May 8, 1912, and 1918.

**Townsend Solitaire.**

*Myadestes townsendi.*— Common summer visitant throughout the park.

Breeding:- Banff Museum has a nest with 4 eggs collected by Sanson, June 14, 1909. Fledglings were observed with their parents at Graveyard, July 17, 1939.

Migration:- First seen, April 20, 1908, and April 28, 1914; last seen September 20, 1909.

Specimens:- National Museum of Canada, 2, collected at Banff, in May, 1891; Banff Museum, 1, collected at Banff, received from Ottawa.

**Golden-crowned Kinglet.**

*Regulus satrapa.*— Widely distributed summer visitant. It may be present all winter; at any rate it was present at Banff on February 28, 1941.

Specimens:- National Museum of Canada, 1, collected at Banff, May, 1891.

**Ruby-crowned Kinglet.**

*Corthylio calendula.*— Common summer visitant throughout the park.

Migration:- Years recorded, 6; average date of arrival, April 27; earliest date of arrival, April 16, 1913.

Specimens:- National Museum of Canada, 2, taken at Banff, May, 1891; Banff Museum, 1, taken by Sanson at Banff, May 20, 1908.

**Rock Pipit.**

*Anthus spinoletta.*— Common transient throughout the park and summer visitant above timber-line.

Breeding:- A nest containing 5 eggs was found by Cowan on Clearwater Pass, July 15, 1943.

Migration:- Up to June 16, 1939, large flocks were passing at the Yaha Tinda Ranch and Scotch Camp.

Specimens:- National Museum of Canada, 2, Banff, 1891, and August 29, 1930 (by Cowan); Banff Museum, 1, May 14, 1911, collected by Sanson.

**Sprague Pipit.**

*Anthus spraguei.*— Not recorded in the park, but worthy of mention because it inhabits the Yaha Tinda prairie.

**Bohemian Waxwing.**

*Bombycilla garrula.* — Common and widely distributed, probably resident through most of the year.

Specimens:- National Museum of Canada, 3, taken by Spreadborough in 1891 at Banff; Banff Museum, 2, April 3, 1920, and March 5, 1928.

**Cedar Waxwing.**

*Bombycilla cedrorum.* — Common summer visitant throughout the park.

Specimens: - National Museum of Canada, 2, taken by Spreadborough at Banff; Banff Museum, 2, from Banff, received from Ottawa, 1 of them collected June 18, 1891, presumably by Spreadborough.

**Northern Shrike.**

*Lanius borealis.* — Sanson records one collected for Banff Museum in 1914-15, while the Museum list shows one from Banff, 1919, received from Wm. Noble. Sanson's notes show "first observations" on April 9, 1908, and April 1, 1914.

**Red-eyed Vireo.**

*Vireo olivaceus.* — Rather rare summer visitant, recorded only from the Banff area, except for a singing male seen by Cowan at Windy Cabin, July 3, 1943.

Breeding: - in the Bow Valley, according to Macoun.

Specimens: - National Museum of Canada, 1, by Spreadborough, 1891; Banff Museum, 1, Banff specimen received from Ottawa.

**Warbling Vireo.**

*Vireo gilvus.* — Summer visitant, not uncommon on the eastern side of the park and at the Yaha Tinda Ranch.

Breeding: - Clarke observed fledgling young at Spray River Cabin, August 9, 1939.

Specimens: - National Museum of Canada, 3, taken in 1891. Preble (N.A. Fauna No. 27, 1908) states that Loring collected 1 at Banff in August, 1894.

**Tennessee Warbler.**

*Vermivora peregrina.* — Common summer visitant on the eastern side of the park and at the Yaha Tinda Ranch.

Specimens:- National Museum of Canada, 2, collected 1891; Banff Museum, 1, Banff specimen received from Ottawa, taken June 4, 1891. Preble (N.A. Fauna No. 27, 1908) states that Loring collected 1 at Banff on August 27, 1894.

**Orange-crowned Warbler.**

*Vermivora celata.* — Summer visitant, not uncommon on the eastern side of the park.

Breeding: - Macoun reports a set of eggs from Banff in the Kennard collection.

Specimens:- National Museum of Canada, 2, collected in 1891.

**Yellow Warbler.**

*Dendroica aestiva.* — Macoun reported this species as breeding in large numbers at Banff, and Spreadborough collected three, now in the National Museum of Canada. It has occurred at Banff since, being observed by Sanson, who gives April 26, 1908, as an arrival date. However we have failed to observe it and question its abundance at Banff and its occurrence elsewhere in the park.

It is common on the east slope.

**Myrtle Warbler.**

*Dendroica coronata.*— This species and the next are two similar complementary species, like the two flickers already discussed. The myrtle warbler is the eastern and northern species and the Audubon warbler its western and southern counterpart. The two meet within Banff Park where both are summer visitants. The myrtle warbler occupies the Northern Coniferous forest and the Audubon warbler the Montane and Subalpine forests, as well as most of the region where these forests overlap the Northern Coniferous forest. There is a narrow belt where either may be found, and both occur as transients over a much wider area. Clarke suspected hybridization in 1939 in a brood near the North Saskatchewan Crossing.

The myrtle warbler is recorded as a resident at the North Saskatchewan Crossing and Indianhead, and also at the Yaha Tinda Ranch. At Banff it is only a transient (observed May 5, 1914 by Sanson), but was abundant there in the first week of June, 1943 (June 6, 30 seen by Cowan).

Specimens:- Spreadborough took 2 in 1891, 1 being now in Banff Museum and 1 in the National Museum of Canada.

**Audubon Warbler.**

*Dendroica auduboni.*— Abundant summer visitant in all but the eastern fringes of the park, where it is replaced by the Myrtle warbler.

Breeding:- We have no nesting dates, but young being fed by parents are seen commonly (e.g. July 17, 1939, Graveyard, August 4, 1939, Goat Creek).

Migration:- Years recorded, 8; average date of arrival, May 6, earliest date of arrival, April 23, 1914.

Specimens:- National Museum of Canada, 4, collected at Banff in 1891.

**Townsend Warbler.**

*Dendroica townsendi.*— Evidently a common summer visitant of certain Subalpine Forest areas near the Brtish Columbia border and a straggler, or rare summer visitant over a much wider area. Clarke found it abundant on June 13, 1943, near the boundary on the Banff-Windermere highway. Cowan saw one near Whiteman Cabin on June 14, 1943, and J. Alden Loring collected a male at Banff on August 28, 1894, (cf. Preble, N. A. Fauna 27, 1908).

**Northern Water-thrush.**

*Seiurus noveboracensis.*— Scarce summer visitant, noted by Macoun as breeding around Vermilion Lakes in July, 1891, and observed by Cowan at Whiteman Cabin, June 15, 1943.

**MacGillivray Warbler.**

*Oporornis tolmiei.*— Common summer visitant throughout the park.

Specimens:- National Museum of Canada, 2, taken by Spreadborough in 1891; Banff Museum, 1, from the Cave and Basin, June 7, 1919, collected by Wm. Noble.

**Maryland Yellow-throat.**

*Geothlypis trichas.*— Common summer visitant at Banff, widely distributed in the park.

Breeding:- Cowan found it nesting at the Second Vermilion Lake in 1943.

Migration:- Years recorded, 3; average date of arrival, May 20; earliest date of arrival, May 5, 1909.

Specimens:- National Museum of Canada, 3, collected by Spreadborough, 1891; Banff Museum, 2, June 5, 1918, and June 10, 1891, the latter received from Ottawa.

**Black-capped Warbler.**

*Wilsonia pusilla.*— Abundant summer visitant throughout the park.

Breeding:- Young were observed being fed by parents at Spray River, July 21, 1939.

Specimens:- National Museum of Canada, 3, collected in 1891; Banff Museum, 2, Banff, May 31, 1915, by N. B. Sanson and June 8, 1891, received from Ottawa.

**American Redstart.**

*Setophaga ruticilla.*— This species is an abundant summer visitant in the Northern Coniferous forest and extends its range also into the Montane forest portion of Banff Park. It is common at the Yaha Tinda Ranch and very local on the eastern side of the park.

Specimens:- National Museum of Canada, 3, collected at Banff by Spreadborough in 1891; Banff Museum, 2, Banff, May 31, 1915, by Sanson and June 8, 1891, received from Ottawa.

**House Sparrow.**

*Passer domesticus.*— Year-round resident at Banff and Lake Louise.

Breeding:- Sanson records nest-building, June 25, 1913.

**Western Meadowlark.**

*Sturnella neglecta.*— Summer visitant in meadows at low altitudes at Banff, Scotch Camp, and Indianhead. It is abundant at the Yaha Tinda Ranch.

Migration:- Sanson has three "first observations" from May 7 to May 29. These are probably dates of taking up territory and reflect the scarcity of the species as a migrant in the mountains. Earlier dates would represent true migration; we have one report to Sanson, April 7, 1913, which he was inclined to doubt.

**Red-winged Blackbird.**

*Agelaius phoeniceus.*— Summer visitant found in the park only around Banff, although it is common in the foot-hills.

Breeding:- Cowan found it nesting at Vermilion Lakes, June 1943.

Migration:- Most of Sanson's "first seen" dates are in May and must represent occupation of territory rather than spring migration. However, birds seen March 19, 1909, were surely newly-arrived migrants.

Specimens:- Banff Museum, 1, Banff, April 11, 1906, by Sanson.

**Brewer Blackbird.**

*Euphagus cyanocephalus.* — Macoun reports a few seen at Banff in 1891, and it was recorded there by Sanson. Clarke saw several at the Banff dump, June 12, 1943, and he also saw a pair at the Yaha Tinda Ranch in 1939.

**Cowbird.**

*Molothrus ater.*— Summer visitant, widely distributed in the park, but not common except perhaps at Banff.

Migration:- Sanson's dates for this species are in May and June and presumably represent occupation of territory at Banff.

Specimens:- A female in Banff Museum bears a "Banff" label.

**Western Tanager.**

*Piranga ludoviciana.*— Common summer visitant at Banff. We have no records elsewhere in the park, but it is found at the Yaha Tinda Ranch and many enter the eastern side of the park in that region.

Migration:- Years recorded, 6; average date of arrival, May 22, earliest date of arrival, April 30, 1909.

Specimens:- National Museum of Canada, 2, collected by Spreadborough in 1891; Banff Museum, 2, Banff, May 21, 1920, by Sanson, and one from Banff received from Ottawa.

**Rose-breasted Grosbeak.**

*Hedymeles ludovicianus.*— On June 6, 1943, a female, observed by Cowan, spent several hours foraging and calling loudly in the vicinity of Lake Minnewanka Cabin. We have no other records.

**Lazuli Bunting.**

*Passerina amoena.*— Said by Macoun to have been "not common" at Banff in 1891. We have no other records for the park but it is found at Yaha Tinda Ranch and probably occurs more or less regularly along the eastern boundary.

**Evening Grosbeak.**

*Hesperiphona vespertina.*— Macoun states that it was observed at Banff in April, 1891, by Spreadborough. In 1943 Cowan saw two pairs, one near Banff on June 8 and another at Healy Creek on June 17.

**Purple Finch.**

*Carpodacus purpureus.*— Macoun states that the purple finch was "not rare" at Banff on May 27, 1891. Spreadborough collected a specimen, now in the National Museum of Canada. Since that time we have only Sansons' record of two at Banff, April 30, 1912, and Cowan's observation of a pair near Lake Minnewanka Cabin on June 6, 1943. It is to be expected along the eastern side of the park.

Breeding:- Macoun states that purple finches were breeding at Banff in 1891.

**Pine Grosbeak.**

*Pinicola enucleator.* — Erratic year-round resident, found throughout the park, usually common enough. In 1943 it was neither seen nor heard by Cowan.

Specimens: - Macoun states that it was collected in 1891. Sanson mentions a specimen in his 1920-21 annual report.

**Common Rosy Finch.**

*Leucosticte tephrocotis.* — Common summer visitant above the timber-line. In spring and autumn it is found as a transient at lower elevations.

Breeding: - At Molar Pass, July 20, 1943, Cowan saw 12 pairs foraging about the upper edge of the snow cornice and carrying food to nestlings in the cliffs above.

Migration: - Among arrival dates given by Sanson are April 1, 1903, April 1, 1908, February 26, 1910, April 4, 1911, April 28, 1913, and March 23, 1914. In the autumn of 1912 it was present from October 9 to November 2. A large migrant flock was seen by Clarke in Pipestone Pass, June 26, 1939.

Specimens: - Macoun records specimens taken in 1891 on Mt. Aylmer. Two, taken in that year, are in the National Museum of Canada. Banff Museum has 6 Banff specimens presented by E. J. Ballard, 2 study skins, Banff, March 26, 1916, and November 3, 1919 and a mounted albino taken in October, 1919, at Banff. Cowan collected 4 for the University of British Columbia Museum of Zoology.

**Red-polled Linnet.**

*Acanthis linaria.*— Common winter transient. Our records are for Banff, but it must occur in many parts of the park. The hoary redpoll, *Acanthis hornemanni,* probably occurs also, but records are lacking.

Migration: - It lingers in spring as late as May 12.

Specimens:- Banff Museum, 5, including 4 by Sanson, Banff, March 16, 1914, and a skin, November 3, 1915.

**Pine Siskin.**

*Spinus pinus.* — Abundant summer visitant in all parts of the park.

Specimens: - Banff Museum, 2, including a Banff specimen taken in 1891, received from Ottawa, and 1 taken May 21, 1918, by Wm. Noble.

**American Goldfinch.**

*Spinus tristis.* — Clarke saw one at Canmore, June 10, 1943. Its occurrence in the park is probable.

**Red Crossbill.**

*Loxia curvirostra.* — Erratic year-round resident. For this species we have only Macoun's statement that it was common at Banff in July, 1891, Sanson's that it was commonly seen on his 1913 field trip to Simpson Pass, and also Sanson's inclusion in a list of birds of Sulphur Mountain.

Specimens:- National Museum of Canada, 3, taken in 1891.

**White-winged Crossbill.**

*Loxia leucoptera.* — Abundant but erratic year-round resident of all parts of the park. It is much more commonly recorded than the red crossbill. In 1943 Cowan saw no crossbills at all.

Specimens:- National Museum of Canada, 2, taken at Banff in 1891; Banff Museum, 3, including a mummified specimen, Banff, 1898, a specimen taken by Sanson, April 14, 1914, and one by G. C. Shedden, R.N.W.M.P., June 22, 1915.

**Spotted Towhee.**

*Pipilo maculatus.*— Sanson records one at Banff from June 7 to June 9, 1908.

**Lark Bunting**

*Calamospiza melanocorys.* — Spreadborough collected one at Banff in May, 1891 (National Museum of Canada).

**Savannah Sparrow.**

*Passerculus sandwichensis.* — Common summer visitant in open places throughout the park.

Migration: - First seen, April 30, 1906; April 25, 1943.

Specimens:- National Museum of Canada, 3, taken at Banff in 1891. Preble (N. A. Fauna, No. 27, 1908) records 1 taken by Loring, August 29, 1894.

**Vesper Sparrow.**

*Pooecetes gramineus.* — Common summer visitant in natural meadows along the eastern side of the park.

Specimens: - National Museum of Canada, 5, collected by Spreadborough, 1891 at Banff.

**Slate-coloured Junco.**

*Junco hyemalis.*— Abundant and universally distributed summer visitant. Sanson remarks that juncos sometimes stay all winter and specifically states that one did so in 1911-12.

Breeding: - On June 12, 1943, at Banff, Clarke found a nest containing young.

Migration: - In spite of statements as to its erratic occurrence and occasional presence all winter, Sanson gives a series of 8 arrival dates, averaging April 3.

Specimens: - National Museum of Canada, 3, taken at Banff by Spreadborough in 1891; Banff Museum, 6, including May 21, 1915 (2), May 21, 1918 (by Sanson), July 19, 1906, and May 3, 1920.

**Red-backed Junco.**

*Junco oreganus.* — A Banff specimen of this species was forwarded to Munro in the flesh. In the last week of April, 1943, migrant flocks of juncos seen by Cowan at Lake Louise contained almost as many red-backed juncos as slate-coloured juncos. However, no red-backed juncos were seen in the park during the summer months.

**Tree Sparrow.**

*Spizella arborea.* — Clarke thought he heard this species on two of the higher summits of the park in June. The possibility of the tree sparrow being a summer visitant at high altitudes is worthy of being borne in mind by naturalists visiting the park.

**Chipping Sparrow.**

*Spizella passerina.*— Abundant summer visitant throughout the park.

Breeding: - Young were observed being fed by parents at Spray River, July 21, 1939.

Migration: - Average of 7 arrival dates, May 9.

Specimens: - Banff Museum, 4, including 2 from Ottawa, collected at Banff in 1891, 1 by Sanson, July, 1906, and 1 June 30, 1915. Preble (N.A. Fauna, No. 27, 1908) records 1 collected at Banff by Loring, August 28, 1894.

**Clay-coloured Sparrow.**

*Spizella pallida.* — Abundant summer visitant on the east slope and at Yaha Tinda Ranch, but scarce in the park, which it penetrates only along the Bow and Red Deer Rivers.

**Brewer Sparrow.**

*Spizella breweri.* — Abundant summer visitant above timber-line and also along meadow-bordered streams throughout the park.

Specimens:- 2, Banff, collected by Cowan for the National Museum of Canada, August 21, 1930 (juvenile) and August 23, 1930.

**White-crowned Sparrow.**

*Zonotrichia leucophrys.* —Abundant summer visitant throughout the park at all elevations and in all forest zones.

Breeding: - Nest with eggs, Spray River Cabin, June 10, 1943 (Cowan). Fledglings are commonly seen.

Migration:- Years recorded, 6; average date of arrival, April 30; earliest date of arrival, April 20, 1908.

Specimens: - National Museum of Canada, 2, by Spreadborough at Banff, 1891; Banff Museum, 7, including Banff, September 22, 1915 (Sanson), Banff, May, 1909 (Sanson), Banff, May 20, 1917 (2).

**Golden-crowned Sparrow.**

*Zonotrichia coronata.* — Summer visitant at timber-line, so far observed only at Bow Summit and Pipestone Pass, but possibly well distributed.

Breeding:- Cowan found a nest at Pipestone Pass, July 15, 1943, containing 4 newly hatched young.

Migration: - On August 29, 1930, Cowan saw migrants in the amphitheatre on Cascade Mountain.

**Fox Sparrow.**

*Passerella iliaca.* — Common summer visitant, well distributed throughout the park, especially at high altitudes.

Specimens: - National Museum of Canada, 6, of which 5 were taken at Banff in 1891, and 1 (by Cowan) on August 29, 1930, in the Cascade Mountain Amphitheatre.

**Lincoln Sparrow.**

*Melospiza lincolni.* — Common summer visitant in wet meadows and bogs throughout the park.

Specimens: - National Museum of Canada, 3, taken at Banff in 1891 by Spreadborough; Banff Museum, 1, Banff, May 27, 1916 by Sanson.

**Song Sparrow.**

*Melospiza melodia.* — Common summer visitant on the east slope in the Northern Coniferous forest but in the park it has been found in only three localities. They are the marsh below the Cave and Basin, the shores of the second Vermilion Lake and along Fortymile Creek. The two latter colonies were discovered by Cowan in 1943.

Breeding: - Reported by Macoun; birds seen by Cowan were evidently on nesting territories.

Migration: - First seen, April 18, 1911.

Specimens: - Banff Museum, 1, received from Ottawa, collected June 1, 1891, presumably by Spreadborough.

**Lapland Longspur.**

*Calcarius lapponicus.* — Sanson records his observation of 9 individuals, May 19 to May 21, 1903. Evidently this transient species is seen on rare occasions.

**Chestnut-collared Longspur.**

*Calcarius ornatus.* — On April 25, 1943, a lone male was twice flushed and examined by Cowan at a distance of 8 feet, on the open wet meadow 18 miles west of Banff.

**Snow Bunting.**

*Plectrophenax nivalis.* — Common winter transient. Our records are for Banff but it probably visits most of the park. Clarke saw a flock roosting in a tree at Banff, February 28, 1941.

Migration: - First seen in autumn on October 30, 1909, October 18, 1912, and November 3, 1913; last seen in spring on April 8, 1908, and April 29, 1913.

Specimens: - Banff Museum, 1, Banff, March 16, 1909, by Sanson.

## CURRENT LITERATURE

PETERS, H. S.

Green-winged Teal, Banded in California, taken in Labrador. *Bird Banding, Vol. 15, p. 72, 1944.*

It was banded in the fall of 1940 and killed in the summer of 1943.

PETERS, H. S.

Iceland-banded Purple Sandpiper, recovered on Baffin Island, N. W. T. *Bird Banding, Vol. 15, pp. 114-5, 1944.*

Banded in 1942, recovered in 1943.

HERMAN, CARLTON M.

The blood protozoa of North American birds. *Bird-Banding, Vol. 15, pp.89-112.*

Contains a list of parasites with the known bird hosts of each; a list of bird hosts, with the known parasites of each; and a four and a half page bibliography.

GROSKIN, H.

Eastern Goldfinch makes an 800-mile trip. *Bird-Banding, Vol. 15, p. 161.*

Banded at Ardmore, Pa., April 1942; found dead, July, 1943, near St. Andrews, N. B. —A. L. RAND.

J. A. MUNRO.

Studies of waterfowl in British Columbia, Pintail. *Can. Journ. Research, Vol. 22, pp. 60-86, 1944.*

This is another of Munro's excellent studies on the waterfowl. The pintail is an abundant transient through British Columbia; some breed, especially in the Caribou region; some winter, especially in the Fraser Delta. However the chief breeding grounds are in Alaska, and the chief wintering grounds in Oregon and California. With the aid of the banding data migration routes and times of migration are worked out, and it seems that units of populations may travel together in successive years. Breeding is discussed and display, nests and young. It is shown that the males take no part in the care of the young, but when incubation starts leave the females and band together in small groups on water nearby.

Results of the examination of stomachs for food determination are given. The paper closes with an estimation that the pintail is second only to the mallard in importance; its destructiveness to crops is not great and is largely controllable. —A. L. RAND.

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# CURRENT LITERATURE

FISHER, JAMES, AND H. G. VEVERS.

The breeding distribution, history and population of the North Atlantic gannet (*Sula bassana*), Part 2.

The changes in the world numbers of the gannet in a century. *Journal Animal Ecology, Vol. 13, pp. 49-62.*

The second part of this important paper discusses the period 1834-1934. There was a steady decrease in the world population until about 1894, since when there has been a steady recovery in numbers, and there is no indication that the present steady rise in numbers will cease. This increase has taken place during a period in which man still exploits the gannet, but over-exploitation and unplanned destruction have been stopped. In small colonies breeding is abnormally inefficient.

—A. L. RAND

MURPHY, LOUISE.

Bonaventure, Island of Wings. *Acadian Naturalist, Vol. 1, pp. 180-182.*

A popular sketch of the bird life. The starling is said to have been first seen in 1931 when it nested on the school house.

—A. L. RAND.

BAILLIE, J. L.

Charles Fothergill (1782-1840) *Can. Hist. Review, Vol 25, pp. 376-396, 1944.*

An historical account of Fothergill, a man of exceptional versatility and talent, who was the pioneer naturalist in southern Ontario, but is now almost unknown.

His many manuscripts, some of which deal with the natural history, have but recently been unearthed, and are being studied at the Royal Ontario Museum of Zoology, Toronto.

—A. L. RAND.

VLADYKOV, VADIM-D.

Etudes sur les mammifères aquatiques III Chasse, biologie et valeur économique du Marsouin Blanc ou Béluga (*Delphinapterus leucas*) du fleuve et du golfe Saint-Laurent. *Départment des Pêcheries, Province de Québec, Quebec, pp. 194, photos, maps and charts and English summary. 1944.*

In 1928 the first complaints were received that white whales were destructive to cod and salmon fisheries in the Gulf of St. Lawrence. In the years 1932-38 bounties of $15 each were paid on up to 558 animals annually. In 1938 the Fisheries Department of the Province of Quebec started an investigation as to the effect of the white whale on commercial fisheries, a project carried on by Dr. Vladykov. In the present paper some of the results obtained are described, notably the local distribution and factors affecting it, methods of capturing, size and growth, external appearance, reproduction and habits, and the value of the skin, oil and meat. The text is well documented with abundant references to other studies, and there is a bibliography of 13 pages. Further publications are promised on the food habits and the detrimental aspect of this mammal, and on the taxonomy.

—A. L. RAND.

HARLOW, RICHARD C.

Breeding of the American Hawk Owl in New Brunswick. *Acadian Naturalist, Vol. 1, p. 171.*

Records a nest with six young at Tabusintac, June 7, 1925, the first nesting record south of the St. Lawrence. —A. L. RAND.

## SEPARATES OF PAPERS ON BIRDS REQUESTED

The United States Division of Wildlife Research maintains a very valuable set of files on the geographic distribution of birds. Authors of ornithological articles published in the Canadian Field-Naturalist are urged to send to the Division two copies of separates of each of their papers. This will greatly assist in the compilation of the data on bird migration and distribution.

Separates should be sent to: F. C. Lincoln, In Charge, Migratory Bird Investigations, Division of Wildlife Research, Fish and Wildlife Service, Department of the Interior, Washington 25, D.C. —EDITOR

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# The CANADIAN FIELD-NATURALIST

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VOL. 59 SUTTON WEST, CANADA JULY-AUGUST, 1945 No. 4

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JAN 2 1946

# MAMMALS OF THE OTTAWA DISTRICT [1]

*By* A. L. Rand
*National Museum of Canada, Ottawa*

This is a Preliminary List of the mammals recorded for the area within 30 miles of Ottawa, with occasional data from just outside the area, to clarify the picture.

There has been no previous list of the mammals of this area. The palaeontologist, E. Billings (1856) in writing general accounts of mammals, included some Ottawa data from personal observation. The long-time Ottawa resident, W. P. Lett, wrote an excellent series of general mammal papers for the early numbers of the Canadian Field-Naturalist 1884-90) and included some extremely interesting local data. About 1900 the zoological branch of the Ottawa Field-Naturalist Club reported various mammal items of local interest, including notes on records made by F. A. and W. E. Saunders who then lived in Ottawa. Since then only occasional items have appeared.

Dr. R. M. Anderson has been collecting information on local mammals by correspondence, interviews, and studying specimens for more than 28 years, and this information, in the files of the National Museum, has been made available to me. The late C. H. Young of the Museum staff, from 1904 to 1937, did considerable local field work, and C. E. Johnson and C. L. Patch, both of the Museum staff, have carried on field work since 1916. In recent years Dr. H. B. Hitchcock has investigated hibernating bat populations in the vicinity of Ottawa.

Much of the present paper is based on information from the above sources. I have also carried on some field work as opportunity offered, have interviewed local fur buyers and gathered bits of scattered data from many people.

I am indebted to many people for help in compiling this paper. To Dr. Anderson who has placed his manuscript notes at my disposal: to Mr. C. L. Patch and Mr. C. E. Johnson for their information; to Dr. H. B. Hitchcock for unpublished data on bats; to Mr. Wayne Robinson, local Ontario game officer, who aided me in making contacts; to Mr. E. Black and Mr. Robert Kizell, local fur buyers, for information; to Dr. R. T. D. Wickenden and Mr. James Windsor for their help in supplying carcasses for study. To these gentlemen, and to the many others mentioned in the text, I am deeply indebted.

The Ottawa area, with its 30-mile radius, has its northern half in Quebec, its southern part in Ontario. The Ottawa River, a 600 yard stream flowing east and west, is the boundary between the provinces. The southern half of the area is part of the undulating St. Lawrence lowlands with an altitude of 200-300 feet above sea level. A few miles north of the Ottawa River these lowlands meet the abrupt edge of the Gatineau Hills, the edge of the Laurentian Shield, that rise to 1125 feet above sea level in King Mountain, the highest point in our area.

There are many lakes in the Gatineau Hills, and the swift Gatineau and Lievre Rivers flow through these hills into the Ottawa. From the south the slow-flowing Rideau River enters the Ottawa.

The original forest cover on the St. Lawrence lowlands was probably mixed hard woods; birch, maple, oak, elm, and basswood; on sandy flats were white pine stands, and cedar and tamarack swamps were common. Now much of this country is fertile farmlands, abundantly interspersed with wood lots and areas of second growth. In the Gatineau Hills the original vegetation of the more humid north-facing slopes was composed of spruce, hemlock, and yellow birch; elsewhere were mixed areas of hardwoods of white birch, sugar maple, and beech. Now logging and fires have destroyed much of this forest cover, and it is given over largely to second growth. There are few occupied farms except along the river valleys.

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The climate of Ottawa is characterized by cold winters with much snow, and hot summers: the following data are from information over the last ten years supplied by the Dominion Meteorological Service.

The first killing frosts come between September 13th and October 3rd; the freeze-up comes between November 14th and December 7th, and the first snow between October 18th and December 6th. Snow lingers into late April, and occasionally into May, even in the city; and the last killing frosts during the past ten years occurred from April 23rd to May 23rd. Sub-zero weather is from December to March, with an extreme of-36° F.; in July and August short periods of 90° F. are of regular occurrence, with an extreme of 100° F.

Snowfall, occurring from November to April, has varied between 50 and 90 inches; total annual precipitation varied from about 30 to 40 inches.

The zonal concept of Merriam lately has been much criticised but, until a more workable hypothesis is put forward, I prefer to use it. The northern part of our area, roughly the Gatineau hills, is strongly Canadian Life Zone; that south of the Gatineau hills is Transition Life Zone.

Northern ranging mammals that occur (or used to occur) in the area are:

Smoky Shrew *Sorex fumeus*
Pigmy Shrew *Microsorex hoyi*
Hoary Bat *Lasiurus cinereus*
Marten *Martes americana* (formerly)
Fisher *Martes pennanti* (formerly)
Lynx *Lynx canadensis* (formerly)
Red Squirrel *Tamiasciurus hudsonicus*
Northern Flying Squirrel *Glaucomys sabrinus*
Wood Mouse *Peromyscus maniculatus*
Red-backed Mouse *Clethrionomys gapperi*
Porcupine *Erethizon dorsatum*
Woodland Jumping Mouse *Napaeozapus insignus*
Varying Hare *Lepus americanus*
Moose *Alces americanus*
Caribou *Rangifer caribou* (formerly)

Mammals with a more southern range, nearing their northern limits in this area are:

Brewer's Mole *Parascalops breweri*
Masked Bat *Myotis subulatus*
Pipistrelle Bat *Pipistrellus subflavus*
Raccoon *Procyon lotor*
Long-tailed Weasel *Mustela frenata*
Black Squirrel *Sciurus carolinensis*
White-footed Mouse *Peromyscus leucopus*
Cottontail Rabbit *Sylvilagus floridanus*
Virginia Deer *Odocoileus virginianus*

For a number of species this is an area in which the change occurs from one subspecies to another as follows:

| Species | Northern form | Southern form |
|---|---|---|
| *Tamias striatus* | *griseus* | *lysteri* |
| *Microtus pennsylvanicus* | *fontigenus* | *pennsylvanicus* |
| *Lepus americanus* | *americanus* | *virginianus* |

With the change in conditions attending settlement, many changes occurred in the composition of the mammal fauna. Trapping has eliminated the marten, fisher, wolverine, and lynx from our area; the otter has decreased in numbers, and the beaver was exterminated and reintroduced. The cougar, elk and caribou are completely gone from the whole region, and now the moose only straggles into our area occasionally.

There are recent additions to our fauna: House rats and house mice have been introduced; coyotes and cottontail rabbits have spread naturally from the south. The black squirrel, once only a straggler, has become common (aided in part by introduction?).

We still have many larger mammals about, and even into the city; deer are common within ten miles of the Parliament buildings. Bears, wolves and coyotes still occur; as do muskrats, mink, weasel, skunk and fox.

Intensive study recently has shown that some small mammals, which were formerly not suspected, such as the pigmy and smoky shrews and the woodland jumping mouse, occur hereabout, and Dr. Hitchcock's work on bat hibernation has revealed several additional species of bats. By searching of old records there are other species such as cougar, and wolverine, that we may be able to establish definitely as having occurred. Additional field work will undoubtedly add records of other species, now only suspected to occur, such as the water shrew, least weasel, and lemming mouse.

In such a settled area as this, about the nation's capital, one would not expect the importance of mammals to bulk large, and yet they do have an importance. Every year the local press carries stories of the depredations of wolves and bears, depredations whose significance is hard to assess. House mice and rats undoubtedly destroy goods of more value than the damage done by bears and wolves; meadow mice injure shrubbery, and there are occasional cases of black squirrels injuring gardens, and red squirrels proving an annoyance in the walls of houses.

Game animals, deer and rabbits, supply sport for many hunters. Foxes supply both sport and fur; and that a considerable harvest of fur is taken annually is shown by the following estimate of the amount of fur taken in the Ontario portion of our area, purchased by some local dealers in the 1943-44 season. (This would be only part of the local catch, as that from the Quebec side of the Ottawa River is not figured).

| *Animal* | *Number taken* | *Total Value* |
|---|---|---|
| Raccoon | 400 | $ 1,200 |
| Weasel | 350 | 350 |
| Mink | 125 | 1,875 |
| Skunk | 1,300 | 2,600 |
| Red Fox | 1,700 | 25,500 |
| Muskrat | 4,000 | 10,000 |
| | Total — | $41,525 |

This total fur yield, an estimated part of the total fur catch of the Ontario part of our area, gives the surprisingly high yield of $30 per square mile, which is a much higher yield of fur value per unit area than the average of the whole of Ontario, or of the Northwest Territories in recent years. It is evident that the fur yield, though each trapper gets but a few skins, still is of importance in this well-settled area.

## ANNOTATED LIST

The material in the National Museum of Canada listed in this paper has been studied by Dr. R. M. Anderson in connection with his work on the Mammals of Quebec. I have accepted his determinations, and no taxonomic data are included. I have attempted to summarize the literature and other data available from this area as to occurrence, abundance, habitat preference, time of breeding, number of young, food, cyclic changes in numbers, and importance, so that this paper will serve as a starting point from which to write a comprehensive paper on the Mammals of the Ottawa district.

For a general account of the mammals of Quebec, see R. M. Anderson's "Mammals of the Province of Quebec" published in 1939 in the Annual Report of the Provancher Society for 1938, (reprinted the following year in French, with revisions and additions).

For a general account of Ontario mammals, see E. C. Cross and J. R. Dymond's "The Mammals of Ontario", published by the Royal Ontario Museum of Zoology, Toronto, in 1929.

### Brewer's Mole ; Hairy-tailed Mole.

*Parascalops breweri* (Bachman).— An uncommon species, that reaches the northern limits of its range in our area, barely extending into the edge of the Gatineau Hills. Patch, who collected this species in Frontenac County, country similar to that of the southern part of our area, found it burrowing in hardwood ridges and in the edges of grassy meadows (Patch MS.).

It was first recorded from our area by Whiteaves (1889, p. 36). Jackson (1915, No. Amer. Fauna, No. 38, p. 82) examined a specimen from the National Museum of Canada taken at Meach Lake, and Anderson (1939, p. 54, mentions this locality.

We have specimens in the National Museum from Meach Lake (2, C.H. Young, 1914, 1934); one from Kingsmere (Y. H. Williamson, 1935); and Ottawa River between Stead's Mills and Britannia (E. Brown, 1888). This last is presumably the basis of the early records.

### Star-nosed Mole.

*Condylura cristata cristata* (Linnaeus).— This is a fairly common species here, inhabiting wooded swamps and marshy ground, where it burrows in the black soil. Their presence is indicated by the mounds of earth they throw up. Dow's swamp is a favoured locality. (C. E. Johnson).

Mr. Johnson found a nest near Britannia in July, 1916. It was under a half-rotten stump, that when pushed over exposed the nest of dead grass. It contained 5 half-grown young that are now on exhibition with part of the nest in the National Museum.

Jackson (1915, No. Amer. Fauna, No. 38, p. 19) examined 4 specimens from Ottawa.

In the National Museum are 16 other specimens from the Ontario part of our area, including Rockcliffe and Dow's swamp, collected since 1894; and from the Quebec part we have 3 specimens from Aylmer and 1 from Meach Lake.

**Cinereus Shrew.**
*Sorex cinereus cinereus* Kerr.— This little shrew is fairly common, inhabiting both dry and wet forest, and brush, and has been taken in Dow's swamp and the Rideau gardens. Some years ago Johnson pushed over a half-rotten stump in the hardwood area near Billing's Bridge and disclosed a grass-and-leaf nest the size of his fist, that contained a single adult shrew (Johnson, verbal).

Jackson, in his revision of this species (1928, No. Amer. Fauna, No. 51, p. 49), had specimens from the Ottawa area.

In the National Museum are 9 specimens from the Ontario side of the Ottawa area, collected since 1919 (mostly by Johnson); and from the Quebec part, 2 from Aylmer and 1 from Larrimac Golf Links 12 miles up the Gatineau River.

**Smoky Shrew.**
*Sorex fumeus fumeus* Miller.— The only record for the Ottawa district appears to be the specimen examined by Anderson (1939, p. 57) from west of Hull. This specimen is in Mr. Hoyes Lloyd's private collection.

[2] [**Water Shrew.**
*Sorex palustris albibarbis* Richardson.— Jackson (1928, No. Amer. Fauna, No. 51, p. 177) maps the range of this form as including the Ottawa Valley. There appear to be no records for this area, but Saunders and Davis (1931, pp. 193, 194) took one by Whitefish Lake (Kazabazua) and another near Danford Lake, just north of the Ottawa district.]

**Pigmy Shrew.**
*Microsorex hoyi intervectus* Jackson.— Evidently a rare species, as but one has been recorded, a specimen taken near Leitrim, 28 Sept. 1929 (1930 Baker and La Rocque, p. 20) and now in the National Collection.

**Short-tailed Shrew.**
*Blarina brevicauda talpoides* (Gapper).— One of the commonest and most widespread species; found in most habitats.

Billings (1856, f., p. 219) recorded two shrews, probably this species, in the mouth of a fox he shot near Ottawa, and Ballantyne and Lett (1890, a, p. 92) record this species, as does Anderson (1943, p. 50).

Patch trapped about 45 specimens in the fall of 1943 in a few weeks near Beechwood Cemetery. The same fall these shrews were very common in Dow's swamp, as indicated by a little random trapping, when about every trap held a shrew each morning, but the next spring, 1944, shrews were very scarce in the same area, indicating a heavy over-winter loss (they were not trapped out in the fall).

Patch took a female at St. Charles (Maxwell) Lake near Farrellton, Quebec, on Aug. 29, 1942, that contained 5 large embryos.

There are many specimens from this area in the National Collection dating back to 1907.

**Little Brown Bat.**
*Myotis lucifugus lucifugus* (Le Conte).— A common species, flying about forest, field, and town, during the summer, and known to hibernate in LaFlèche cave in winter, where Hitchcock has banded a number.

Scott reported that 14 out of 15 bats he secured in 1884 were *Vespertilio subulatus* [*M. keenii*] (1884, Small and Lett, b, p. 282), but early identifications in this group were uncertain and they were more likely this form. Taverner's record (1924, p. 76) of this species active in winter in Ottawa surely refers to *Eptesicus fuscus*. In December 1938, C. G. MacKay visited LaFlèche cave and found 51 bats (sp?) in hibernation; one of them, sent to the National Museum, was this species. In 1939 Hitchcock (1940, p. 56) found 5 of this species hibernating there on Nov. 24th; and on Jan. 18, 1941, found them in hibernation there again (1941, p. 46). In 1942 I accompanied Dr. Hitchcock to LaFlèche cave on Dec. 19, and we found but a single individual of this species in hibernation.

Miller and Allen (1928, U.S. Nat. Mus., Bull, 144, p. 46) in their revision list Ottawa specimens in the U.S. Nat. Mus. Our National Museum has a series from both the Ontario and Quebec portions of our area, the earliest collected being in 1889 (labelled *Vespertilio subulatus*).

**Eastern Masked Bat.**
*Myotis subulatus leibii* (Audubon and Bachman).— An uncommon bat; known to hibernate in LaFlèche cave. Until 1941 there was but a single record of this bat for Canada, one taken in southern Ontario and

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[2] —Species for which there are no definite records, but of probable occurrence, are placed in square brackets.

recorded in 1931. In 1941 Hitchcock (1941, p. 46) found this species in Hastings county, Ontario, and on Jan. 18, 1941, found 4 hibernating in LaFlèche cave. Anderson (1941, pp. 23-27) comments on this record, discusses its occurrence, and says it can be expected in other caves. In 1942, Dec. 19, I accompanied Dr. Hitchcock to this locality and we found one of this species.

The National Collection contains two specimens from LaFlèche cave (1941, H. B. Hitchcock).

**Long-eared Bat ; Keen's Bat.**

*Myotis keenii septentrionalis* (Trouessart).— Evidently not a very common species; known to hibernate in LaFlèche cave in the Gatineau area. Dr. Hitchcock has banded a number of this species there.

In their revision of this genus Miller and Allen (1928, U.S. Nat. Mus. Bull. 144, p. 106) list an alcoholic specimen from Ottawa in the U.S. National Museum.

On Nov. 25, 1939, Hitchcock found 17 individuals hibernating in LaFlèche cave, and again on Jan. 18, 1941, he found this species hibernating there. On Dec. 19, 1942, I accompanied Dr. Hitchcock to LaFlèche cave and we found 10 of these bats, mostly hanging singly in the inner part of the cave.

In the National collection are two specimens from this area, a skin and skull and an alcoholic both from LaFlèche cave, 1942.

**Northern Pipistrelle Bat.**

*Pipistrellus subflavus obscurus* Miller.— Evidently a rare species; known to hibernate in LaFlèche cave.

F. A. and W. E. Saunders took a bat in "Clark's woods" just north of the Experimental Farm on July 10, 1890, and this specimen lay unidentified in the latter's collection for about 30 years, when it was found to be this species and to represent the first record for Canada (Saunders, 1920, p. 17, and 1932, p. 279). Up until 1941 there had been two other records of this bat in Canada; then Hitchcock found it hibernating in LaFlèche cave (1941, Hitchcock, p. 46).

Anderson comments on this record, the 5th for Canada, and summarizes the other records (1941, pp. 27-29).

In 1942, on Dec. 19, I accompanied Dr. Hitchcock to LaFlèche cave and we found a single individual in hibernation, that we collected, the only specimen from this area in the National Collection.

**Silver-haired Bat.**

*Lasionycteris noctivagans* (Le Conte).— An uncommon summer resident, migrating southward in winter; earliest date, June; latest, Aug. 27 (of 7 specimens, N.M.C.).

During an excursion of the Ottawa Field-Naturalist's Club to Casselman in 1884, Mr. Fletcher secured one of these bats (1884, Small and Lett, b, p. 282).

F. A. and W. E. Saunders collected this bat at Ottawa in July 1890 (1890, Ballantyne and Lett, b, p. 198), and Saunders (1932, p. 279) says that most of the specimens he has met with were at Ottawa.

In the National Collection are seven specimens, from Ottawa, Hull, and Aylmer, the two earliest specimens being taken in 1885 by E.F.G. White and W. E. T. Lowtens.

**Big Brown Bat.**

*Eptesicus fuscus fuscus* (Beauvois).— This is the bat most commonly taken in Ottawa, often being taken in buildings. It hibernates singly in buildings, as well as in numbers in LaFlèche cave, and is the species that frequently is active in winter, both in buildings and, in mild spells of weather, outdoors. A number have been banded.

On Dec. 16, 1884, one was found in the Parliament Buildings and identified by C. H. Merriam under the name of *Vespertilio serotinus fuscus* (1884, Small and Lett, b, p. 282). On Apr. 18, 1896, one was seen flying about, a day on which the temperature reached 82° F. (1896, Small, p. 45). On Feb. 24. one was caught flying about a corridor of the Parliament Buildings and reported by Macoun (1908, p. 266) who says it is common at Ottawa. The bats active in winter recorded as *M. l. lucifugus* by Taverner (1924, p. 76) were surely this species.

Hitchcock found 23 hibernating in LaFlèche cave on Nov. 25 (1940, p. 56) and on Jan. 18, 1941 he found the species there again (1941, Hitchcock, p. 46). On Dec. 19, 1942 I visited this cave with Dr. Hitchcock and we found 36 of this species hibernating. One bunch of 16, and one of 8 were hanging to the roof of the outer chamber where the temperature was about 32° F. (it was below zero outside).

Others, were found, singly or in smaller groups, hanging up, or in small crevices farther back in the cave. The numbers of the various species found in the cave were as follows: *E. fuscus*, 36; *M. keenii*, 10; *M. lucifugus*, 1; *M. subulatus*, 1; *Pipistrellus subflavus*, 1.

Banding operations were carried out on all Dr. Hitchcock's visits to this and other caves, and he is preparing a detailed account of his work and its results.

The winter of 1943-44 at Ottawa was rather mild, and the following is a summary of the big brown bats seen during the winter in Ottawa, that came to my attention: Nov. 20, with freezing weather and before the snow came, one was flying about Aylmer Avenue at dusk, as though feeding; one in December and one on Jan. 4 that had been picked up were brought to me; about Jan. 20, during a spell of mild weather, one appeared flying about the Museum lecture hall during a Ottawa Field-Naturalists' Club meeting, and Mr. V. Goodwill told me he had seen one fly up from the snow ahead of him that afternoon; a number of other people spoke of seeing bats in the few days preceding. On. Feb. 5, in weather that was just freezing, I saw one fly strongly, 30 feet to 40 feet up, from Dow's swamp, across the canal, and disappear toward the houses on the far side. On March 11, with 10° of frost, A. S. Rand saw one fly by and light under the eaves of a house, and go into a crevice.

April 18, a lovely sunny spring day with a maximum temperature of 52°, was the first day bats flew about commonly; at least 3 were over our yard in Ottawa, and a number were continually in sight over the nearby canal at dusk.

Perhaps the mild winter accounted in part for the large number of bats that came to my attention; but during the preceding severe winter one was picked up frozen and brought to me when the temperature had been 25° and more below zero for several days. Evidently they sometimes come out in severe weather, even if they do not survive.

In the National Collection are series from both the Quebec and the Ontario part of our area; the earliest specimen from Hull, 1888, by Brother Secordian.

### Red Bat.

*Lasiurus borealis borealis* (Muller).— A rare summer resident, migrating southward in winter.

Dr. C. H. D. Clarke saw one about his residence in Ottawa during the fall migration a few years ago.

The National Collection contains 3 specimens; two caught in the Victoria Memorial Museum, Sept. 13, 1922 (W. Manchester) and one caught in W. P. Lett's cellar, March 11, 1924.

### Hoary Bat.

*Lasiurus cinereus* (Beauvois).— A rare summer resident, migrating southward in winter.

According to Ballantyne and Lett (1890, b, p. 198) the bats shot by F. A. and W. E. Saunders in July 1890, about Ottawa, included the Hoary Bat, but Saunders, 1932, does not mention Ottawa as a locality.

In the National Collection are three specimens; an adult collected 14 August, 1903 by W. P. Kirby in Hull, and two half-grown young from Ottawa. These last, attached to their mother, were found on the lawn of the Central Experimental Farm on July 3, 1925, by Dr. R. E. DeLury. They were being attacked by a crow. Placed in an open-fronted box, the parent deserted during the night and DeLury was unable to raise the young.

### Black Bear.

*Ursus americanus americanus* Pallas.—Common in the less settled country north of the Ottawa River, frequently coming about settlements in the fall; scarce in the more settled part south of the Ottawa River. Hibernates from early in December to early in April (1887, Lett, b, pp. 306-314).

Billings, (1856, d, p. 100) in a general account of the species, mentions two skulls of bears from the Township of Huntley, killed about 1854, and (1856, e, pp. 114-115) mentions a brown bear from the Chats, on the Ottawa River somewhat west of our area, that he refers provisionally to *U. cinnamomum*[3], the cinnamon bear, evidently a specimen in the brown phase. Small and Lett (1884, b, p. 281) record Mr. Devlin as saying that this species occurs in our area.

Lett (1887, b, pp. 306-314) gives an extended account of the black bear, with many local details. He tells of Mr. Billings and a companion returning home one evening in 1825 or 1826 from Hull to Billing's Bridge and meeting a bear between Sparks Street and the Rideau River (probably in the vicinity of Bank Street). The men had but an axe. Billings cut and sharpened a stake that his companion thrust into the chest of the bear; while the bear was occupied with this, Billings despatched it with a blow of the axe on its head. Lett also mentions shooting a bear on the south side of Rideau Street, near Nicholas Street, and comments favorably on the quality of its flesh.

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[3] —A form now restricted to the black bear of the Rocky Mountain region under the subspecific name **Ursus americanus cinnamomum** Audubon and Bachman (1854, Quadr. N. Amer., Vol. 3, p. 125). The brown or "Cinnamon" colour phase is found more commonly among black bears in the west, and is very rare in the east. — R. M. Anderson.

About 1875 one frequented the bush on the MacKay estate, New Edinburgh, for several weeks;and another was seen, until snow came, about Brigham's(now Brewery) Creek in Hull.

Lett says it is a native of the Ottawa Valley, still to be found within 8 or 10 miles of Ottawa, and quite abundant the season of 1885.

Bears were quite common on the Lievre River in October 1904 (Lemieux, 1905, p. 123), and Prince (1907, p. 100) recorded them at Hammond.

Black bears are still common in the country north of the Ottawa River, correlated with the sparse settlement in the Gatineau Hills. This abundance is well illustrated by a brief survey of the newspaper clippings from local papers that Dr. Anderson has collected from 1931 to 1944.

In the fall of 1931 bears were reported as not unusually numerous in the immediate vicinity of Ottawa and Hull, but in the more remote parts they were much more in evidence, and bolder, than normal. This was said to be correlated with a dry year, and a failure of the berry and nut crop on which the bears ordinarily depend for food. A bear was reported at Aylmer dump; two were shot on the Mountain Road, one north of Aylmer and one north of Deschênes; three were seen about Kingsmere. (Mr. T. Lawson told Dr. Anderson 11 had been killed about Wakefield that fall). Between Wakefield and Maniwaki, (25 to 80 miles north of Ottawa) bears were reported as particularly destructive to sheep. A $15 bounty was said to be in effect.

In 1933 bears were reported to be increasing, but we have few clippings besides one telling of 3 that came on the Glenlea golf course.

In 1934 they were common from Wakefield north, killing many sheep, calves and pigs.

In 1936 one was reported on the Chaudière golf course, Aylmer Road; in 1937 one came into Main Street, Aylmer; in 1940 one was shot in the outskirts of Aylmer, one on Aylmer dump, and one in the cemetery on the outskirts of Hull; in 1941 they were reported plentiful about Wakefield, and one man was said to have lost 8 lambs in a night; and in 1943 one man had 40 beehives ruined in a night.

There are few recent records for our area south of the Ottawa; one is of a bear shot at Moose Creek in 1924. This scarcity is correlated with denser settlement.

The following from just west of our area (Ashdad, near Renfrew) is of interest. On March 17, 1944, a female with young was discovered in hibernation under the clay-covered roots of an upturned tree, which formed a cavern about 6 feet deep. A dog roused the female, that charged out and was shot. The three young in the cave were estimated to be 5 or 6 weeks old. Fifty yards away was the den of another animal that had left hibernation some time earlier.

The weights of some of the bears were given (whether actually weighed or not is not stated; but they sound reasonable). Some of these are: 125, 150, 165 (the mother of the 3 young), 220, 302, 350 pounds.

There are old accounts of wounded or trapped bears mauling and even killing people from near our area (Lett, l.c.). One newspaper account from Blue Sea Lake (1934), just north of our area, tells of a man encountering a female bear with two cubs in June, and being charged by the bear. He climbed a tree, the bear after him. Finally he succeeded in kicking the bear down out of the tree.

Lett gives, apparently as local information, that bears hibernate under roots of large trees or in rocky caves from early December to early April; are in good condition by October, and the skins are prime after mid-November. Lett also records a very pale coloured bear, very like a polar bear in color, killed in the Gatineau about 1837, that was evidently at least a partial albino.

One of the oldest specimens in the National Collection is the cranium of a black bear killed in Osgoode, Canada W., 1838, (near Osgoode, Carleton County, Ont., about 20 miles south east of Ottawa).

**Raccoon.**

*Procyon lotor lotor* (Linnaeus).— A not uncommon species.

In 1884 Small and Lett write (b, p. 281) that Mr. Devlin says raccoons occur in the area; in the fall of 1884 they noted an unusually large number of raccoons on the Ottawa market, some of them being very fat.

In 1931 Mr. T. Lawson told Dr. Anderson that two were killed at Kirk's Ferry (Gatineau River) on Sept. 27, and several had been seen there during the summer.

In the summer of 1943 Mr. J. Stoddard told me raccoon were plentiful about Meach Lake, causing annoyance by disturbing provisions placed in a spring for refrigeration. Mr. E. S. Richards, Superintendent of Gatineau Park, reported them common in the park in 1944.

In recent years they have been taken just outside the city limits of Ottawa, in Rideau Park.

Some local fur buyers estimated that in 1943-44 they had purchased about 400 skins of the local crop, and that 5 to 7 skins were the largest catches for single individuals. The average price paid the trapper was about $3.

In the National Collection are 4 local specimens from the Ontario part of our area, the earliest being taken in 1909.

**Marten.**

*Martes americana americana* (Turton).— Formerly probably throughout our area, especially in the spruce forests of the northern part, now probably extirpated.

Our only information about it from the area is Devlin's saying it occurred, (1884, Small and Lett, b, p. 281), and the trapping of one about 1840 near the present village of Carp (Lett, 1890, p. 79).

**Fisher.**

*Martes pennanti pennanti* (Erxleben). —Probably formerly occurred throughout our area, and now probably extinct.

Our only information from this area is Mr. Devlin's saying that it occurred (1884, Small and Lett, b, p. 281); and three trapped near the present village of Carp by W. P. Lett about 1840 (Lett, 1890, p. 79).

**Short-tailed Weasel.; Bonaparte Weasel.**

*Mustela erminea cicognanii* Bonaparte.— A fairly common animal; that comes into the outskirts of Ottawa.

Small and Lett (1884, b, p. 281) reported that Devlin said weasels (probably referring to this species), occurred. Saunders (1910, p. 16) reported taking one near Ottawa. The following notes by Percival (1910, pp. 59, 60) from Burritt's Rapids, Rideau River, probably refer to this species. In removing straw from a mow, a weasel was seen to appear repeatedly in the mow. Its nest was found about halfway down. It was the size of a water pail, lined throughout with soft mouse fur, and on the floor was the skin of what had been a pet kitten. A winding passage led to another "room" that must have been the "commissariat", being strewn with the bodies of dead mice, etc. From both "rooms" passages led in all directions. Also included is a second-hand account of 5 weasels that is interpreted as 4 adults moving a young one, but was more likely a female and 4 young.

We have records from Eastview; the edge of Ottawa south; and McKellar Township on the western outskirts of Ottawa. This last was brought to the Museum by Mr. W. Anderson who had taken it in his kitchen in December.

Some Ottawa fur-buyers said that their purchases of pelts taken in the Ontario part of the Ottawa district totalled only an estimated 350, in the 1942-43 season; that people paid them little attention; and that 4 or 5 skins were the most taken by individuals. The average price paid trappers was about $1. These figures may include some *M. f. noveboracensis.*

In the National Collection are recorded 8 skins from the Ontario part of our area, and one from Wrightville (Que.); the earliest is labelled 8 Aug. 1902, W. S. Odell.

**[Least Weasel.**

*Mustela rixosa* (Bangs).— Not definitely recorded from this area, but can be expected, as the race *M. r. allegheniensis* (Rhoads) has been recorded in Quebec as far westward as Ste. Veronique (1939, Anderson, p. 64), and *M. r. rixosa* (Bangs) has been taken in various parts of Ontario, east to Heaslip, near Englehart, Timiskaming district, and there is some circumstantial evidence of the species occurring in south-eastern Ontario (Cross and Dymond, 1929, p. 14, and Saunders, 1932, pp. 282, 283).]

**Long-tailed Weasel.**

*Mustela frenata noveboracensis* (Emmons).— Uncommon; the Ottawa district is near the northern limit of its range.

The National Museum records show a specimen from Ottawa, by Dr. DeLury, 1935; one from Meach Lake, by C. H. Young, 1912; one from Grand Lake, Gatineau County by A. Hamilton, Oct. 28, 1943; and one from near Ottawa's eastern limits, November 11, 1944, by Rowley Frith.

**Mink.**

*Mustela vison vison* Schreber.— Only a fairly common animal; sometimes comes into the city itself.

Devlin said that it occurred in the area (1884, Small and Lett, b, p. 281).

On August 31, 1932, two boys brought into the Museum a mink that they had killed the previous evening at 180 Isabella Street, the Glebe, Ottawa. It had killed 26 chickens, and wounded another, without eating any of them before it was killed.

Local fur-buyers told me that their purchases of mink from the Ontario section of our area totalled about 125 skins in 1943-44, and that 1 or 2 skins were the biggest catch of individual trappers. The skins were purchased for an average of about $15.

In the National Collection is a specimen from Hurdman's Bridge, Ottawa, taken in 1905; and one from Black Rapids, Rideau River, taken in 1917 by C. E. Johnson.

[**Wolverine.**

*Gulo luscus luscus* (Linnaeus).— Probably occurred in our area, but there are no definite records.

In 1884 Lett and Small (1884, b, p. 281) say that settlers confuse lynx, wildcat, and wolverine, but a specimen of wolverine was secured from the Desert (north of our area) and exhibited in Ottawa as a rarity.]

**Otter.**

*Lutra canadensis canadensis* (Schreber).— Probably uncommon in the southern part of our area; more common northward.

At a meeting of the Ottawa Naturalists' Club in 1884 Mr. Scott showed a series of skins loaned by Mr. Devlin, a local fur-buyer. Devlin brought most of his pelts from a hundred miles north of Ottawa. In quality they were exceeded only by those from Northern British Columbia. Skins from the upper Ottawa were not as dark and rich as those from the upper Gatineau, while those from south of us were light and poor, and worth but half as much. Devlin annually bought 400 to 500 skins (most of them evidently from outside our area), at prices ranging from $4 to $15. (1884, Scott, p. 187).

Lett (1884) gives an interesting account of two tame otter he had at Ottawa.

Johnson tells me that about 1920 there were items in the local press about otter seen in the Ottawa River at Ottawa, and at Constance Bay in the winter; and that C. H. Young showed him an old otter slide at Meach Lake about the same time.

A local fur-buyer told me he purchased a few from within the Ontario part of our area during the season 1943-44; and Mr. Richards reported to the Ottawa Journal (April 17, 1944) that otter were occasionally seen in Gatineau Park by the park staff on their patrols.

We have no local specimens in the National Collection.

**Eastern Canada Skunk.**

*Mephitis mephitis mephitis* Schreber.— A common animal in the Ottawa district, often venturing into Ottawa itself.

Billings (1856, g, p. 362) reported one found dead in the Rideau Canal; Mr. Lett shooting one at Ottawa; and the species being rather common in Upper Canada. On the authority of Devlin, Small and Lett (1884, b, p. 281), record it from the area. In his general account of the species, Lett speaks of one caught in a fox trap near Carp (1889, p. 19).

In July 1933 Dr. Anderson received reports of skunks digging holes in Fairmont golf course near Hull, and C. H. Young and A. LaRocque investigated this to find they were digging up the roots of plantain (*Plantago* sp.) and biting a piece out of the fleshy bottom of the root. Examining a skunk stomach, Anderson found parts of such roots in it.

Their unpopular invasions of the City of Ottawa are well illustrated by a survey of newspaper clippings, which tell of the police shooting, in the vicinity of Carruthers and Scott Streets, one that had its head caught in a can; and of their being seen at various other places, including New Edinburgh, Rockcliffe, and Loretta Avenue, Ottawa.

Mr. Richards reports skunks common in the Gatineau Park (1944).

Local fur-buyers told me their estimated purchase of skunks from the Ontario part of our area was about 1300 pelts in 1943-44, and that the highest catches of individual trappers was about 20 to 30 pelts. The average price paid was about $2 apiece.

A fat female skunk weighing 5.5 pounds was found floating in the Rideau Canal last October (1943) and was brought to me. Probably it had fallen into the canal, and unable to scale the vertical walls had drowned, as had the individual Billings mentioned in 1856 (loc. cit.).

In the National Collection are a series of specimens from the Ontario part of our area, the oldest specimen dating back to 1917 (C. L. Patch). All have long narrow white stripes. The young specimens, about one-quarter grown, are dated July, and July 5.

**Red Fox.**

*Vulpes fulva* (Desmarest).— Very common some years; apparently less so in other years; occurs generally over the area, into the edge of the city of Ottawa.

In 1840 Lett caught 27 foxes in a small area near Carp village in Huntley Township (1890, Lett, p. 79).

Billings (1856, f, p. 219) tells of shooting a female fox, with 7 meadow mice and 2 shrews in its mouth, during May in Gloucester Township near Ottawa, and gives details of digging out a burrow in Osgoode Township.

In 1903 Macoun *et al.* (1903, p. 35) record a live silver fox from Coulonge district exhibited in Ottawa.

Foxes were unusually abundant the winter of 1941-42 (R. T. D. Wickenden) and the open season was prolonged for two weeks, with the reason given that foxes were destructive to poultry (clipping, local press).

In 1942-43 foxes were plentiful, but hard weather conditions and deep snow prevented fox hunters from securing many.

In 1943-44 foxes were very common in the Ottawa district and Mr. E. S. Richards reported them common in Gatineau Park.

Years ago a local Hunt Club used to ride to hounds, but now most foxes taken in the Ontario section of our area are shot ahead of hounds. Three fox hunting groups which I know shot 20, 36, and 60 foxes during the season in our area south of the Ottawa River. Local fox-buyers told me that they estimated their purchase of pelts from the Ontario part of our district amounted to about 1700 foxes; bought at an average price of $14 to $15 apiece (1943-44).

Cross and silver foxes are very scarce in this area. Billings (op. cit., p. 222) tells of two young being captured in Osgoode Township, one nearly black and one silver gray. They were kept alive for a time, and later their two pelts were sold for £30 (a better price than they would bring today). Johnson shot a cross fox twenty miles west of Ottawa about 1920; a cross fox was said to have been taken in the outskirts of Ottawa in 1944.

A litter of 5 quarter-grown young red foxes was taken for a Museum group, five miles west of Ottawa on May 21, 1917.

With the cooperation of Dr. R. T. D. Wickenden and Mr. James Windsor in 1943-44 I was able to examine a number of fox carcasses. They had been skinned, with the hind toes removed: 10 males weighed between 8.5 and 11.5, averaging 9.5 pounds; 6 females weighed between 6 and 9 pounds, averaging 7.8 pounds. All these animals were in good condition; most of them had some fat at least about the loins and shoulders, and a few had a thin layer over much of the body. The heaviest animal, the male weighing 11.5 pounds, had a well-filled stomach that, removed intact, weighed 1.5 pounds.

The stomach contents of 23 foxes, and some other notes on their food in this area follows:

October, 1920, a specimen collected for the Museum had its stomach filled with crickets, grasshoppers, and part of a wasp-nest (C. E. Johnson).

Dec. 18 to 27, 1943: Of 8 stomachs, seven contained meadow mice (*Microtus pennsylvanicus*); the number of mice and remains per stomach varied from an estimated 4 to 12 (average 5.3). The only other food present was a small amount of white gristle-like matter (carrion?) in one stomach; one stomach was empty.

January 4 to 25, 1944: Of 10 stomachs examined two contained remains of cottontail rabbits (*Sylvilagus floridanus*), presumably of one individual each; 6 contained meadow mice remains, varying from 1 to 5 mice (average 2.3) per stomach; 1 contained a piece of pigskin (carrion, surely); 2 contained chicken feathers; and 2 were empty.

In late January a fox was reported to have entered a chicken house on the outskirts of Ottawa and to have killed 11 fowl in the night. The animal, said to be a magnificent cross fox, was found in the fowl-house, thus establishing his identity.

February 5 to 29, 1944: Of 5 stomachs examined, one contained six meadow mice and the fur of perhaps as many more, plus a small amount of white suety matter (carrion); and of 2 females taken late in the month, each had a considerable quantity of dead grass in its stomach; and 2 stomachs were empty.

May: Billings (*l. c.*) reported a female fox with 7 meadow mice and 2 shrews in its mouth.

There was an evident change in the food supply correlated with the weather. In December, with shallow snow, mice were easily taken, and it was usual for the stomachs to have 4 to 5 mice in them, and only once was there anything else. In January, with increased snow and crust, fewer mice were found in each stomach, — rabbits appeared in their diet and also chicken feathers, and one was reported to have raided a chicken house. The later February records, — 2 stomachs empty and 2 with considerable grass in them — perhaps correlate with the breeding season. However, food was plentiful enough to keep some fat on the flesh of the foxes throughout the winter.

In the National Collection are many specimens from the area, the oldest being from Chelsea, dated March 20, 1887.

**Eastern Timber Wolf.**

*Canis lupus lycaon* Schreber.— Apparently fairly common in the northern half of our area, but some reports of depredations may refer to those of dogs, and there is the possibility of confusion with coyotes.

Small and Lett, (1884, b, p. 281), report that Mr. Devlin says the wolf occurs in rare instances in the Ottawa area.

Lett, in a general account of the wolf (1890, pp. 75-91), says that in the early days the wolf was dangerously abundant in the Ottawa Valley. During the first years of the settlement of Hull they were very numerous and destructive, killing sheep and disturbing the minds of timid people. A trapper caught one, partly skinned it, put a bell and a collar on it, and allowed this "rather cruelly treated wolf" to go, and it was said after that wolves became scarce about Hull for a number of years.

The old stony swamp west of Bell's Corners on the Richmond Road was infested with wolves at one time. A farmer, driving to Ottawa one night, had his dog seized and carried off by wolves.

In October 1839 on the Goodwood River (near the Duke of Richmond's Estate) Lett heard a pack hunting.

In 1840, near the present village of Carp, wolves killed a number of sheep and young cattle, and after much effort Lett caught three of a pack.

In the winter of 1868, when wolves were plentiful within ten miles of Ottawa, Dr. Bell of New Edinburgh was driving through the long swamp east of Eastman's Springs when eleven wolves chased a deer across the road in front of him.

About 1878, when Lett was camping on Bear Brook, 12 miles from Ottawa, he was awakened by the howling of wolves, and wolves chased a deer through the snow by their camp.

Wolves were very numerous in the Township of Gloucester up to a few years ago, and doubtless many still exist in the solitudes of vast swamps within 25 miles of Ottawa (written 1890).

The following story concerning an Algonquin, Clouthier, and his encounter with wolves near Hull was considered authentic by the old inhabitants of Hull and Bytown. Lett considered that wolves ordinarily dreaded humans, and that if the following were true it was the only case he had heard of in which wolves had attacked a man in this part of Canada. Clouthier disappeared, and when his remains were found, surrounded by those of 14 wolves, it was deduced that he had been attacked by a band of wolves, had shot one with his muzzle loader, and had killed the others with his tomahawk before being pulled down and devoured by the rest of the pack. The dead wolves had also been eaten by their fellows.

Lemieux (1905, p. 123) says wolves were reported to be quite common about White Fish Lake in the fall of 1904.

Prince (1907, p. 100) reports a pack heard howling near Pembina Lake in the Upper Lievre River valley even in the daytime.

Dr. Anderson has accumulated clippings from the local press with headings such as "Shot monster wolf near Carp, had killed sheep worth $500." (Ottawa Evening Journal, Apr. 3, 1943); "Wolves and Bears work havoc in Gatineau Valley" (Ottawa Journal, Sept. 21, 1943); "Killed 100 sheep, Wolf is slain" in Meach Lake area (Ottawa Journal, Oct. 27, 1932); and "An Ottawa man Beset by Wolves" — pack of more than a dozen wolves surounded him while holidaying at Maniwaki and he "shot his way out". (Ottawa Journal, 26, Aug. 1930).

However, other clippings give a different version. One quotes D. J. Taylor, of the Ontario Game & Fisheries Department, as saying he believes dogs, not wolves, are responsible for the sheep killing (Ottawa Journal, Oct. 21, 1941); and another by G. Bryan Curran (a letter to Editor, Ottawa Journal, 22-9-43) thinks that most of these records are of dogs in the Gatineau district in the fall, That wolves still occur in the Gatineau, however, is vouched for by Mr. E. S. Richards, who reported in the local press that wolves were seen in Gatineau Park in the winter of 1943-44, the first time this has occurred since the park was established.

In the National Museum Collection is a specimen from Ironsides, P.Q., dated March 1900, from David Roland; we also have two specimens from just outside our area, in Quebec, one from the Township of Low (1908-9) and one from Point Comfort, 31-Mile Lake, P.Q., (1925).

**Coyote ; Brush Wolf.**

*Canis latrans latrans* Say.— Uncommon in the southern part of our area; probably becoming more common as part of an eastward movement of the species.

The first Ontario record appears to be a specimen in the National Collection from north of Thedford, Lambton County, taken Oct. 10, 1919, by G. A. Martelle; our first local specimen is one from near Dunrobin (about 25 miles west of Ottawa) Nov. 12, 1943, killed by Eldon Neeley; though Cross and Dymond (1929, p. 19) record it in Ontario eastward to Ottawa.

The National Museum has secured a specimen from near Luskville, Gatineau County, Quebec, taken Oct. 29, 1944, apparently the first record for Quebec.

In the summer and fall of 1944 many sheep were reported killed by "wolves" in the area just west of the City of Ottawa. About 100 sheep were said to have been killed from the flock belonging to the Dominion Experimental Farm and pastured about the Connaught Rifle Range. Organized hunts resulted in the killing of one coyote and one dog, which, probably properly allocates the blame.

**Lynx.**

*Lynx canadensis* Kerr.— Formerly occurred; now extirpated.

Small and Lett (1884, b, p. 281) report Devlin as saying the lynx occurs.

C. E. Johnson tells me that about 1917 one was captured near the Experimental Farm and exhibited for a time in Devlin's Store.

There are no local specimens in the National Collection.

**[Panther.**

*Felis concolor couguar* Kerr.— Probably occurred in our area in colonial days, though there are no definite records. The species had been extinct in Ontario for nearly fifty years according to Cross and Dymond (1929, p. 19).

Lett, writing in 1887 (a, pp. 127 ff.), says it occurred at one time in the valley of the Ottawa in considerable numbers, and that about 100 years earlier (before 1887) the panther was found in every part of Ontario and Quebec].

**[Atlantic Harbor Seal.**

*Phoca vitulina concolor* (DeKay).— There are old circumstantial accounts of the occurrence of seals in the Ottawa River at Ottawa.

The "Ottawa Citizen" of August 15, 1936, quotes a report from "The Quebec Mercury" of Dec. 16, 1865, that a seal was killed in the Gatineau River a day or two earlier, and that strange as it may seem these animals ascend the Ottawa every winter, remaining about air-holes in the ice to watch for fish.

Small and Lett (1884, b, p. 282) say a seal was reported as shot recently off Gatineau Point in 1884; that two years earlier one was shot off New Edinburgh by Mr. Askwith, and that solidary individuals have been seen from time to time in former years in the Ottawa.

Dr. Anderson (MS.) says harbor seals occur frequently at the head of tide water at Montreal and (1930, p. 169 and 1939, p. 70) that they straggle up the Ottawa as far as Hull; and that there are old records (referring to the above data).]

**Woodchuck ; Groundhog.**

*Marmota monax rufescens* Howell.— A common animal in the more open country; hibernates in winter.

In 1939 Anderson (p. 73) says specimens from the lower Gatineau are distinctly referable to *M. m. rufescens;* and in 1943 (p. 54) records specimens from Carleton County, Ont.

The following data are on the seasonal period of activity that appears to be from late March to late September: Spring dates of first individuals recorded in seven different years between 1920-1939 are: Apr. 10, Apr. 8, Mar. 31, Mar. 30, Mar. 29, Mar. 19, Mar. 18 (Johnson); the earliest I saw tracks in 1944 was Mar. 24. Latest fall dates for two years are Sept. 6; Sept. 28 (one filling in his back door entrance with grass and leaves.

The following are the available data on time of reproduction; June 18, 1933, 3 half-grown young basking at entrance to den; July 14, 1935, one half-grown young caught. A family of woodchucks, one-third grown, was taken locally July 3, 1924, and is now on exhibition in our Museum.

C. E. Johnson has seen several woodchucks some 15 feet up in large trees.

Mr. Dunn tells me that a number of years ago, when he was raising mink, he used to shoot woodchucks for mink food. He said that he found woodchucks very wary along travelled roads, but along bush roads they were less so, and he sometimes bagged six in an afternoon. As mink food they were not especially relished, and the bones were difficult to grind, being hard and splintery.

In the National Museum is a local series from both sides of the Ottawa River, the oldest specimen being dated 1889 (J. Herring). One of these specimens is an albino, and Johnson saw a black woodchuck on the outskirts of Ottawa a few years ago.

**Northeastern Chipmunk.**

*Tamias striatus lysteri* (Richardson).— Generally common in the densely wooded and bush areas; hibernates; occasionally active in winter.

In 1888 Ballantyne (pp. 38-41) says this is a common species, and mentions a tame one in his garden.

Lloyd (1923, p. 118) quotes reports of chipmunks killing nestling house wrens and chipping sparrows.

The following data on seasonal activity are supplied by Mr. and Mrs. Hoyes Lloyd and Mr. C. E. Johnson. First spring records, March 6 - Apr. 10 (average, Mar. 22) for 12 years records between 1921 and 1944. Johnson supplies the following fall dates: chipmunks active Nov. 2, 3, 4, and 5, 1920; seen Nov. 1, 1922; Oct. 25, 1930; Oct. 29, 1932, and an unusual record of one active Dec. 26, 1932.

Among the food being gathered in the fall for storage, Johnson has observed basswood seeds, hazel nuts, and beech nuts; in the spring he found one with the sprouting keys of sugar maple in its cheek pouches.

There is a series of locally-taken specimens in the National Collection; the earliest dated 1884.

Two female specimens were carrying 4 embryos each on April 25, and another on April 26.

A Kingsmere specimen is melanistic, and albinos have been recorded at Rockcliffe (H. Lloyd).

Anderson (1939, p. 74) says the form about Ottawa intergrades with *T. s. griseus* in the upper Gatineau Valley just north of our area.

**Red Squirrel.**

*Tamiasciurus hudsonicus loquax* Bangs.— Common; not confined to the vicinity of conifers, but more common there.

This was one of our common squirrels in 1888 according to Ballantyne (1888, pp. 35-38; the chipmunk was the other) who gave a general account of the species.

He says 3 or 4 young are born in early June, and mentions a nest in a hollow stump on the edge of a pine woodlot. About his home one fall they fed exclusively on apples, and stored crabapples in forks of branches, and buried plum pits in the ground. At the onset of cold weather they built a nest in the wall of an out building. During cold, stormy winter weather they were not seen for several days at a time. In late fall and winter they ate their arboreal store of apples (possibly eating only the seeds). After the apples were used up they ate spruce buds; with flower buds of maples. Larch buds were especially prized.

At Meach Lake Ballantyne saw one swim across a stream, when it could have crossed easily on a bridge.

At Angers, P. Q., a young sparrow, old enough to fly, was seen being devoured by a squirrel (undoubtedly this species). The squirrel was driven from its prey, and the bird found to be still warm (1908, Michaud, p. 188).

At Black Rapids, Rideau River, one was recorded with a white-tipped tail (1923, McElhinney, p. 77).

Odell (1925 and 1926) found mushrooms, including the deadly (to humans) *Amanita muscaria*, in such places and condition as to justify the assumption that red squirrels had stored them temporarily, and had eaten them with impunity.

Just north of our area Davis (1931, p. 193) found this squirrel very common, and estimated the population in hardwood country in September at a pair to the acre.

Anderson, (1939, p. 75), gives the form *loquax* as extending into the lower Gatineau Valley at least, but identified specimens from just north of our area as *gymnicus* (in Davis, 1931, p. 193), but the range of *gymnicus* was considered as extending farther west at that time and some immature summer specimens are as small and dark as typical *gymnicus*.

Anderson, 1942, p. 33, lists specimens of this form from Meach Lake and Wakefield.

Dr. R. E. DeLury reported a late litter of young; 5 left their nest prematurely about Oct. 7 (M.S.).

Today they come into the outskirts of the city, and during the winter of 1943-44 two lived in the walls of a neighbor's house and caused some annoyance by chewing articles stored in an attic. For days at a time they were not active during our coldest weather, as Ballantyne had reported in 1888.

In the National Museum of Canada is a local series from both Ontario and Quebec.

**Black Squirrel ; Grey Squirrel.**

*Sciurus carolinensis leucotis* (Gapper).— A common species in and about Ottawa; and straggles into the southern end of the Gatineau Valley. The proportion of gray phased animals to black phased is perhaps 1 of the former to 6 of the latter.

It is currently held that black squirrels were absent until introduced into Rockcliffe between 1920 and 1930, as Anderson (1939, p. 76) records. However, it has a much longer history in the Ottawa area, though it has become common only in the last decade or so.

In 1856 when it was considered that the grey and the black squirrels were different species, Billings wrote (1856, h, p. 437) that the grey squirrel was never seen in the Ottawa Valley, while the black squirrel was only occasionally found there. He writes that it was unknown in the city of Ottawa for the first 30 years of white settlement; of late a few were seen every year, but it was not thoroughly established.

In 1888 Ballantyne (pp. 41, 42) writes that the black squirrel was seldom seen in the vicinity of Ottawa, and that he had seen only two or three individuals, all in the neighborhood of Beechwood Cemetery. A few years earlier he found them plentiful at Smith's Falls, about 40 miles south of Ottawa. As the country was cleared they gradually disappeared. Of the grey phase, he had only one record for the Ottawa area, and had seen one at Smith's Falls.

In 1890 Ballantyne and Lett (b, p. 199) give a report of a black squirrel caught near Britannia in October; and say there has been no other report for the area for several years.

In 1903 Macoun *et al* (pp. 34-36) report a black squirrel from the Gatineau district exhibited in Ottawa.

Though outside our area to the west, Seton's 1911 (p. 175) report of specimens and sight records at Pembroke, where it was then rare, helps to round out the picture of their northern distribution.

C. E. Johnson and A. LaRocque tell me that from 1920 to about 1930 black squirrels were scarce, and mostly confined to the area about Beechwood Cemetery (as they had been in Ballantyne's time). Since that time, and shortly after a rumored introduction, they have become common through most of Ottawa and in the hardwood forest immediately to the south.

Outside summer nests are common sights well up in maple and elm trees in Ottawa South, and it is common to see 4 or 5 squirrels along the Driveway. They are occasionally seen in the centre of the city. Judging by the animals I have seen in the last two years, there is about one grey to 6 black pelaged squirrels.

Mr. P. A. Taverner, who regularly feeds this species, had a pair of squirrels pass the severe winter of 1942-43 in an outside nest on a ledge by his window. For days at a time during below-zero weather they would not stir out of their nest.

Motor traffic is perhaps the most important hazard of the grey squirrels in towns. In two years I have seen about 6 squirrels that have been killed by traffic.

These squirrels do a certain amount of damage by digging up tulips and other bulbs and eating parts of them, and by eating rosebuds.

We have in the National Museum a small series of this species from Ottawa, and one, the earliest local specimen, from Ironsides, P.Q. (1927).

**Mearns' Flying Squirrel.**

*Glaucomys sabrinus macrotis* (Mearns).— The actual abundance of this nocturnal animal remains to be established; presumably it is not uncommon.

In 1888 Ballantyne (p. 42) wrote that this species had been seen in tthe neighborhood, and that a member of the Ottawa Field-Naturalists' Club used to have one as a pet. In 1890 Ballantyne and Lett (b, p. 198) reported F. A. Saunders seeing one in July.

In 1930 Dr. Anderson (p. 94) reported finding one in a nest 8 feet up in a thickly-branched white cedar in the outskirts of Hull; in 1939 (p. 76) he wrote that this subspecies occurs at least 70 miles north of Ottawa in the Gatineau Valley.

Patch gave me several records of its occurrence in the Rockcliffe area, and he raised part of a family of 5 young that came from near Wakefield.

In the National Collection is a small series of local Ontario specimens, the oldest, dated 1886, from C. H. Pinkey.

**Beaver.**

*Castor canadensis canadensis* (Kuhl). — Probably abundant over the whole area when it was first settled by whites. It was later almost or quite extirpated, but has recently been introduced into Gatineau Park and has become common there.

In 1884 Small and Lett (b, p. 281) reported beaver occurring in the Blanche and the Lièvre Rivers. In 1906 Prince *et al.* (p. 58) reported a colony established at Green creek some distance east of Ottawa.

In 1917 C. L. Patch and C. E. Johnson saw an old beaver dam and old beaver work at Constance Bay. In 1929 Mr. J. A. Machado told Dr. Anderson of remains of an old beaver dam, about a quarter of a mile long, on Barnard's Lake, near North Wakefield. An old local resident was reported as saying that the last beaver in the region had been killed about 70 years earlier.

In 1931 Davis (p. 94) saw fresh work and tracks at Danford Lake, just north of our area, and was told of the presence of beavers nearby.

Mr. E. S. Richards reports in the local press (1944) that about 30 pairs of beaver had been introduced into Gatineau Park a few years ago; that they thrived and multiplied and are now to be found on almost every lake.

Beaver occurrence and beaver houses reported at Billing's Bridge in the local press recently refer to muskrats.

**Deer Mouse ; White-footed Mouse.**

*Peromyscus maniculatus gracilis* (Le Conte).— A common species of woodlands and brush, probably becoming scarcer southward.

Patch found a late nest, probably of this species, with 5 very small young, under a log September 8, 1917 (Patch, 1917, p. 63). C. H. Young, on visiting his summer home at Meach Lake, in November 1932 found two of these mice in a box in the cabin, and with them a quantity of shelled beechnut kernels weighing three pounds, that they had stored.

In the National collection is a local series from both north and south of the Ottawa River.

**White-footed Mouse.**

*Peromyscus leucopus noveboracensis* (Fischer).- A common species, probably becoming scarce toward the northern edge of its range, which is about 40 miles north of Ottawa in the Gatineau Valley (Anderson, 1939, p. 79).

The early records of Small and Lett (1884, p. 150) and Ballantyne and Lett (1890, b, p. 198) tell of its occurrence and entering Ottawa houses (under the name *Hesperomys leucopus*). In recent winters several have been taken in houses in the Glebe, Ottawa.

The local habitat relations and relative abundance of this species and *P. m. gracilis* need to be worked out.

The National Museum has a series of local specimens.

**[Cooper Lemming Mouse.**

*Synaptomys cooperi cooperi* Baird.— Not recorded from within our area, but probably occurs, as Davis and Saunders (1931, Davis, p. 193) collected a female with 4 embryos in early September at Whitefish Lake about 50 miles north of Ottawa.]

**Red-backed Mouse.**

*Clethrionomys gapperi gapperi* (Vigors).— One of the common forest animals in the northern part of our area, becoming rarer and more local in the southern part.

In 1890 Saunders took this species in Dow's swamp (1890, Ballantyne and Lett, b, p. 198, and Saunders, 1932, p. 297).

In the National Collection are specimens from both the Ontario and Quebec part of our area.

**Meadow Mouse.**

*Microtus pennsylvanicus pennsylvanicus=fontigenus*.— This is the common mouse of the fields and grasslands, and is sometimes found in the forest, some distance from any clearing.

In 1856 Billings (f, p. 219) writes of finding 7 meadow mice in the mouth of a fox. In 1884 Small and Lett (a, p. 150) under the name *Arvicola riparia* refer to this mouse as being troublesome in cellars and gardens. In the latter, especially in the early spring, they are said to eat the tender shoots of plants. In winter they eat the bark from that portion of the young orchard trees that is below the snow. Later in the same volume (p. 281) they comment on the unusual depredations of this species in the winter of 1884; in places the undergrowth was destroyed for 25 to 30 yards, and trees 6 inches in diameter were girdled and killed. Maples were mentioned in this connection. In 1890 Ballantyne and Lett (a, p. 92) report one taken in a house in February, after it had eaten off a yard of lace curtain, possibly for the starch.

In 1936 Dr. Anderson noted considerable damage to young trees the previous winter by these mice girdling them, the species most affected being sugar maple, ash, and white cedar (MS.).

In the spring of 1943 and 1944 near Ottawa, when the snow had melted it revealed many runs of this mouse that had been cut through the matted grass. Where the mat had not been deep, the runs showed as shallow troughs; where deeper, they were covered with grass, but everywhere were holes gnawed through the grass mat, evidently where the mice passed from grassy to snow tunnels. Here and there were little grass nests, flattened oval in shape, about 6 to 8 inches across, and resting on little pedestals of ice that were slow in melting. The bark of the wild apple tree was the tree they had most commonly used for food.

The meadow mouse is an important food of the red fox (which see); and Johnson reported a great-horned owl from Mooney's Bay, Ottawa River, that had eaten two of these mice (Johnson, 1923, p. 118).

A study of a series in the National Museum from this area showed that they were intermediate between the race *pennsylvanicus* to the south and *fontigenus* to the north, and the line dividing these two races was drawn somewhat arbitrarily along the Ottawa River (Rand, 1943, Can. Field-Nat., 57, p. 117).

**Muskrat.**

*Ondatra zibethica zibethica* (Linnaeus).— The muskrat is fairly common in the marshes and edges of the waterways about Ottawa, and enters the edge of the city, but its numbers are rather strictly controlled by trapping, which is now limited to a period in the spring.

Besides Devlin's statement that the species occurs in the district (1884, Small and Lett, b, p. 281), and that the Saunders brothers saw it in 1890 (1890, Ballantyne and Lett, b, p. 198), the references in the literature are to freaks; an albinistic specimen from the Rideau River near St. Patrick's bridge (Prince *et al.*, 1906, p. 61), and a black muskrat from near Ottawa (Prince, 1907, p. 100).

The muskrat is still trapped for fur on the edge of Ottawa. Local fur buyers told me that from the Ontario part of our area they purchased an estimated 4000 muskrats annually, and that in the spring of 1944 they were paying an average of $2.50 a skin. Many trappers bring in 60 to 100 pelts, and a few as many as 200 or 300 for the season.

The National Museum has a small series of locally caught specimens.

**House Mouse.**

*Mus musculus* Linnaeus.— A common species about dwellings, and probably into the neighboring fields.

The National Collection has a locally taken series, the register showing that the earliest was taken in 1900 by William Spreadborough, though the specimen appears to be no longer extant.

**House Rat.**

*Rattus norvegicus* (Erxleben).— A common species in Ottawa and other towns; and in the adjacent garbage dumps.

That it has predatory habits is illustrated by what Johnson (1923, p. 97) wrote of one near Hogsback that he saw descending a small hawthorne bush with a young song sparrow; and one night in Ottawa he heard a scuffle and the alarm call of an English sparrow, suggesting that one of these rats had captured a sparrow in the eaves.

That it is preyed upon is shown by its presence in the stomach of a great-horned owl, taken at Mooney's Bay (Johnson, 1923, p. 118).

In the National Museum are local specimens, the earliest taken in 1890 by F. A. Saunders.

**American Porcupine.**

*Erethizon dorsatum dorsatum* (Linnaeus).— A rather uncommon forest animal.

In 1910 Lemieux (p. 16) writes of the abundance of porcupine near Upper Lièvre Lakes. In 1918 Macnamara (pp. 113-118) gives a general account of the appearance and habits of the species, and some personal experiences, presumably about Arnprior; and in 1921 (pp. 70-72) tells of seeing at Lake des Chats, Ottawa River, an adult and a young one that he tried to raise by hand.

In 1939 Anderson (p. 89) writes that the porcupine was still found within a few miles of Ottawa, and that one was killed within a short distance of Hull several years ago.

The National Museum has a series of locally-taken specimens, the earliest dated 1886. One adult male from Kingsmere weighed 17 pounds, 10 ounces. We have one local albinistic specimen; it is white with a slight grey tinge in the pelage of the dorsum, and the claws are whitish.

Eifrig (1910) records a great horned owl with many porcupine quills in its flesh.

**Meadow Jumping Mouse.**

*Zapus hudsonicus ontarioensis* Anderson.— A not uncommon species of meadows and grassland; hibernates.

In 1884 Small and Lett (a, p. 151) report this species from Prescott (outside our area) and say they heard of a pair taken on the Aylmer road a few years previously.

Fletcher (1884, p. 151) tells of one found near Ottawa; and Small and Lett (1884, b, p. 281) say that Prof. Macoun reports one taken in Major Hill Park in 1884, - the first positive record for the district. In 1890 Ballantyne and Lett (a, p. 92) report a specimen from near Billing's Bridge.

In 1943 Dr. Anderson (pp. 59-61) described *ontarioensis*, the form to which our animal belongs.

In the National Collection is a series of locally-taken specimens, the earliest taken in 1889 by J. H. Bartlett.

**Woodland Jumping Mouse.**

*Napaeozapus insignis algonquinensis* Prince.— A forest animal, probably more common in the northern part of our area; hibernates.

There appears to be but a single record for our area, a specimen taken at Meach Lake, 1935, by C. H. Young.

In 1942 Anderson (p. 39) referred this specimen to the newly described subspecies *algonquinensis*.

It will probably be found to be not uncommon locally, as Davis (1931, p. 194) reports taking 16 of them from Whitefish Lake and Danford Lake, just north of our area, in a few days. The principal habitats frequented by them were along streams in both coniferous and hardwood forests.

**Snowshoe Hare.**

*Lepus americanus virginianus* Harlan.— Variable in numbers, depending on the stage of its 10 year cycle; in some years common, and occurs in the Experimental Farm and about the Parliament Buildings.

In 1890 Ballantyne and Lett (b, p. 198) mention its occurrence; in 1909 Eifrig (p. 56) mentions one at the Experimental Farm; in 1903 E. F. G. White saw a very nice black hare, [a melanistic specimen]taken near Ottawa, brought into the market (Anderson, MS.).

Anderson (1939, p. 90) writes that our subspecies *L. a. virginianus* intergrades with the more northern *L. a. americanus* some distance north of the Ottawa River.

There are very few local specimens in the National Collection, the earliest being taken by Patch in 1916.

**Mearns' Cottontail Rabbit.**

*Sylvilagus floridanus mearnsi* (Allen).— A common animal of the bushlands, north to the Gatineau hills. A recent arrival from the south, and this is the northern limit of its range.

Before historic times the cottontail occurred only in southern Ontario (Wintemberg, 1928, Nat. Mus. Can., Bull. 51, p. 6); by 1908 it had spread northward to a line drawn from Lake Simcoe to Trenton, Prince Edward County, and in 1939 it reached Ottawa and shortly afterward spread to the north side of the river (Anderson, 1939, p. 92; 1940, b, pp. 70-72).

Though the cottontail was not detected in Ottawa until 1931, its increase was rapid. The first specimen to come to the Museum was brought in on April 24, 1932, by Gifford Johnson; four others were brought in that year. By April 1933 H. Lloyd reported that cottontails were abundant about his place at Rockcliffe, and by 1934 the local press carried items as to rabbits causing damage to shrubbery, and their destructon by shooting be allowed in what was otherwise the wild life preserve of Rockcliffe.

The cottontail is now a well established part of our fauna, and though it may do some damage to shrubbery and gardens this is very local.

Evidently several litters are born yearly. A specimen taken April 3, 1944, carried 6 embryos; Lloyd sent us a 20-day-old young August 26, 1942.

The National Collection has a series of local specimens.

**Elk.**

*Cervus canadensis canadensis* Erxleben.— Formerly common on the south side of the Ottawa River, and probably ranged to the edge of the Gatineau hills; has been extinct since about 1800.

In 1856 Billings (b, pp. 81 ff.) wrote that according to tradition among the Indians the elk was not uncommon in the valley of the Ottawa, within 120 years. When he wrote it was known only from remains of horn and bone, and Billings thought the horns found had not been lying on the ground for 100 years. In excavating the Rideau Canal a perfect skeleton was found at Hog's Back, about 1825. The antlers, still attached to the skull, were five feet long. Billings heard reports of elk still existing in the western counties of the Upper Province (Ontario).

In 1884 Lett (pp. 107 ff.) wrote that elk had been quite numerous in the Ottawa Valley, found more generally on the south side, and that the hardwood forests were its favorite haunts. Antlers were still frequently turned up by the plough in the vicinity of Ottawa; when a boy Lett found them on the ground about the village of Richmond; he exhibited an antler (at an Ottawa Field-Naturalists' Club meeting) from Eastman's Springs, and 8 years earlier (before 1884) one was found within 2 miles of the city limits of Ottawa. He wrote that Mr. Rice Honeywell, one of the earliest settlers, said that within 70 years he had seen elk, alive and dead, within 4 miles of Ottawa.

Saunders (1932, p. 306) says elk became extinct in Ontario perhaps about 1750. From the above evidence we may conclude that elk were present in the Ottawa district up until about 1800.

Dr. Anderson (1939, p. 93) was unable to find any definite records from the north side of the Ottawa River.

The National Museum has no local specimens.

**Northern White-tailed Deer ; Virginia Deer.**

*Odocoileus virginianus borealis* Miller.— A common animal over our whole area, to within a few miles of Ottawa.

Generally the deer has extended its range northward, probably following lumbering operations and settlements that provide more hardwood second growth and better deer forage But there appear to have been deer throughout our area during historic times.

In 1856 Billings (c, p. 91) wrote that the deer was found throughout Upper Canada west of Montreal and in the tract of hilly country north of the great River Ottawa it extended 150 miles north of that stream. Fur traders reported its presence rarely near the height of land. In Renfrew County Billings says it was very abundant, though 25 years earlier it was rarely seen there.

In 1884 Lett (pp. 110 ff.) gives an extended account of the species. It was common in all parts of the Ottawa Valley and common about Ottawa, roaming hardwood and hemlock ridges in summer, and establishing yards in tamarack swamps in winter. About 30 years earlier Lett saw a yard in Osgoode Township that was four miles square and must have held hundreds of deer. At the time of writing deer had decreased somewhat, and a well-beaten deer yard of 10 acres in extent within 12 miles of Ottawa was no mean representation of the species. He writes that the antlers are full grown by August; the velvet is rubbed off by October and they are shed by January.

In 1904 W.H.H. on a hike from Ottawa to Kirk's Ferry in October saw 4 deer. In 1907 deer were reported at the Experimental Farm, and in Rockcliffe (Saunders, 1907, p. 164; Prince, 1907, p. 100).

In 1939 Anderson (p. 93) writes that in early times the deer was seldom seen north of the Ottawa River, but as forests were cut and second growth grew up they extended their range northward.

E. S. Richards, writing up the Gatineau Park in 1944 (local press), says the deer are very plentiful in Gatineau Park, and it is almost overstocked. In one cedar swamp not far from Meach Lake he counted 28 deer, and all the cedar swamps are well stocked. He says deer have increased greatly in recent years, being scarce in the park in 1938.

Deer are now common within ten miles of Ottawa city, and provide good hunting. In the last few years they have been reported as coming into towns in our area.

The National Collection contains a number of local specimens.

Lett (op. cit.) writes of seeing 2 does with spike horns brought into the Ottawa market. Though the season was late they were still in velvet. Lett recorded an albino buck from this area, and we have one local albino, as well as the record of another.

**Moose.**

*Alces americana americana* (Clinton).— Once common in the northern part of our area, and still not uncommon 100 miles north of us, but now only a straggler in the Ottawa district.

In 1856 Billings (a, p. 70) in a general account of the moose says it occurs on the north shore of the Ottawa River, but occurs only as a straggler on the south shores of the river.

In 1884 Lett (pp. 101-117) writes that the moose is diminishing in numbers each year, but are still comparatively plentiful far back on the north side of the Ottawa River. He writes of two tame moose in the possession of the Marquis of Lorne, one of which was trained to drive in harness.

Lett writes that moose and Virginia deer are not found together, and inclines to the belief that the buck deer attack and drive out the larger moose; [it is more probably due to a habitat difference, a difference in tolerance to settlement and a difference in ability to withstand hunting]. Lett writes that the horns sprout in April, attain their growth by August and fall off in February.

A clipping from the Ottawa Citizen of Sept. 28, 1931, tells of a moose near Aylmer, P.Q., and one shot at nearby Wychwood a few years earlier.

Mr. E. S. Richards does not mention the moose as occurring in the Gatineau Park in 1944, in his release to the local press.

The National Museum does not have any local specimens.

[ **Woodland Caribou.**

*Rangifer caribou caribou* (Gmelin).— Probably fairly common in the northern part of our area at least, less than 50 years ago; now absent.

Though we have no definite records from within our area, Lett's account (1884, pp. 107 ff.) of its status just outside of our area is worthy of mention.

At a meeting of the Ottawa Naturalists' Club in 1884 he exhibited 2 sets of antlers from Kakabouga Lake above the Desert on the Gatineau. He had heard of Indians killing 14 in a few minutes, while the caribou were crossing the Rivière des Lièvres; and wrote that they were still found in considerable numbers on the river as close as 60 to 70 miles from its confluence with the Ottawa, and were still present on the Gatineau above the Desert. He knew of no historical records of its having been found in numbers south of the Ottawa. He concluded that formerly it was undoubtedly common to within a few miles of the north bank of the Ottawa, and occasionally straggled to the south bank.]

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# LESSER KNOWN OTTAWA MAMMALS [1]

*By* A. L. RAND
*with illustrations by* C. E. JOHNSON
*National Museum of Canada, Ottawa*

MOST SMALL MAMMALS are so shy and secretive that they are seldom seen, and are little known. The accompanying illustrations and explanations, it is hoped, will help in making some of them better known. Small mammals often are identified with difficulty, and the National Museum is always prepared to identify or check identifications of these animals.

## MOLES

The big, flattened front feet, held along the sides of the neck, are the most distinctive feature of moles. Their fur is slate or blackish in color.

Fig. 1. **Brewer's Mole,** 6½ inches long, has a short hairy tail.
Fig. 2. **Star-nosed Mole,** 7½ inches long, has a long tail and a fleshy star on its nose.

## SHREWS

These brownish or slate-coloured animals are mouse-like in form, but with elongated pointed noses, and many small, usually chestnut-tipped teeth.

Fig. 3. **Cinereus Shrew,** is 3¾ to 4 inches long, with a tail about 1½ inches long; the **Pigmy Shrew** is similar externally, but slightly smaller and with a shorter tail, about 1¼ inches long; the **Smoky Shrew** is similar externally but larger, about 4¾ to 5 inches long. Each has distinctive skull differences, and for positive identification it may be necessary to submit them to the Museum.

Fig. 4. **Water Shrew,** about 5½ inches long is slaty above and silvery white below, and has fringes of hair on its hind feet.

Fig. 5. **Short-tailed Shrew,** 5 inches long, has a plush-like fur and is often mistaken for a mole, but note differences in front feet.

## BATS

The four large bats we have are easily distinguished by size and colour.

**Hoary Bat,** 5¼ inches long, has brown silver-tipped fur.

**Red Bat,** 4⅜ inches long, has red fur.

**Silver-haired Bat,** 4⅛ inches long, has blackish silver-tipped fur.

**Big Brown Bat** (Fig. 6), 4½ inches long, has brown fur.

The four small bats that occur are difficult to identify, and it may be necessary to submit them to the Museum for final identification.

Figs. 7 and 8. **Little Brown Bat,** about 3½ inches long, has a moderate sized ear, with a blunt tragus, or flap of skin in it (Fig. 8).

Fig. 9. **Masked Bat,** about 3 inches long, is similar but smaller, and has a more blackish face contrasting with the rest of the brown fur.

Fig. 10. Keen's **Bat,** about 3¼ inches long, is similar to the little brown bat, but has a longer ear and a more slender tragus.

**Pipistrelle Bat,** 3½ inches long, is similar to the little brown bat, but instead of dark, brown-tipped fur, has the fur tricolored, each hair with a dark base, pale middle portion and a dusky tip. This is easily seen by blowing on the fur.

## MICE

These are distinguished as rodents (gnawing animals) by the two pairs of chisel-like front teeth.

Fig. 11. The **Deer Mouse** and the **White-footed Mouse** are grey when young; adults are brown above and white below, with large eyes and ears and fairly long tails. They are best told apart by their skulls.

Fig. 11(a) **Deer Mouse,** 7½ inches long, has a slender rostrum with long straight slits in the palate.

Fig. 11(b). **White-footed Mouse,** 7 inches long, has a tapered rostrum with shorter, curved slits in the palate.

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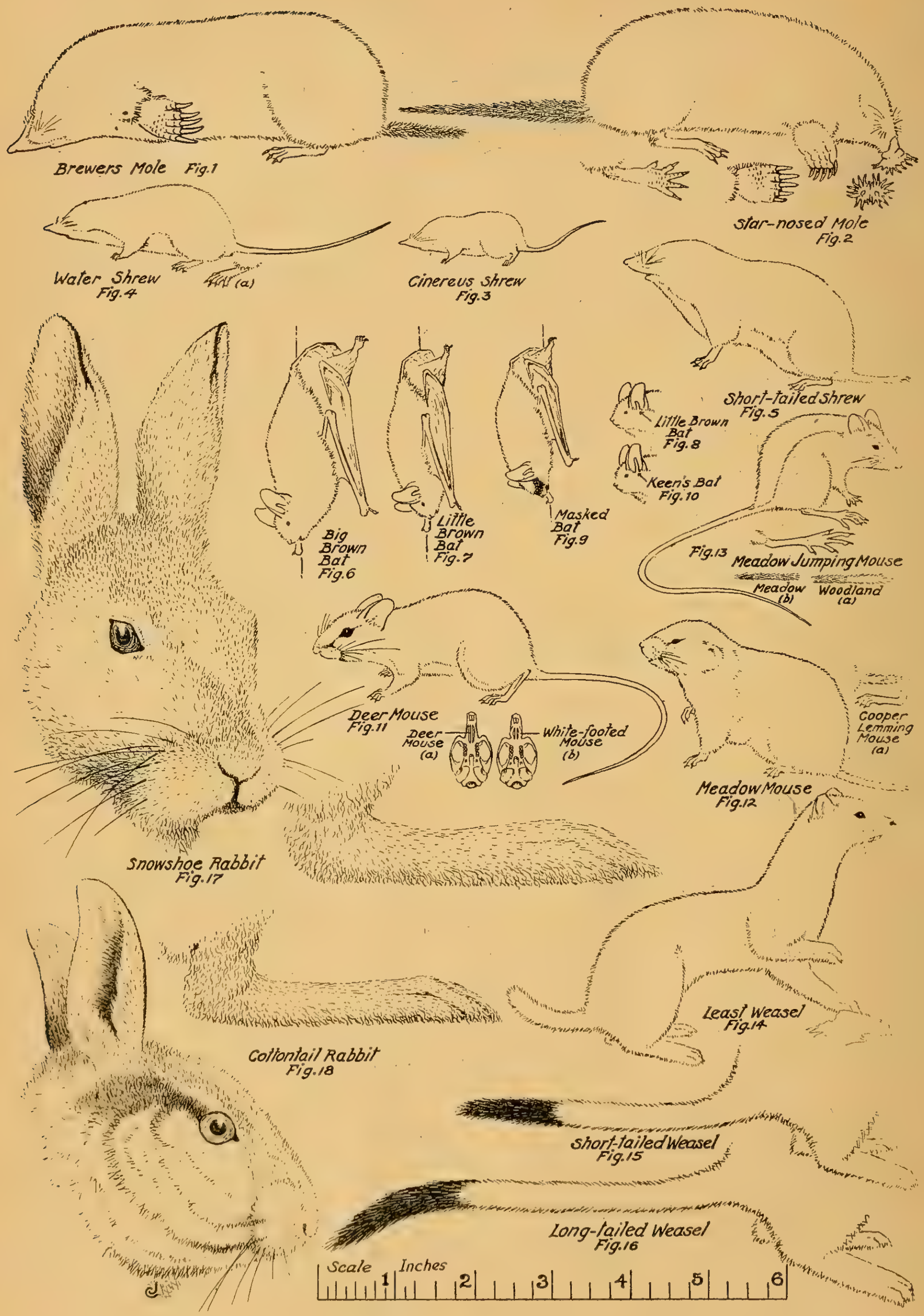

Brewers Mole Fig.1

Star-nosed Mole Fig.2

Cinereus Shrew Fig.3

Water Shrew Fig.4

Short-tailed Shrew Fig.5

Big Brown Bat Fig.6

Little Brown Bat Fig.7

Little Brown Bat Fig.8

Masked Bat Fig.9

Keen's Bat Fig.10

Deer Mouse Fig.11

Meadow Mouse Fig.12

Fig.13 Meadow Jumping Mouse

Least Weasel Fig.14

Short-tailed Weasel Fig.15

Long-tailed Weasel Fig.16

Snowshoe Rabbit Fig.17

Cottontail Rabbit Fig.18

**House Mouse,** 7 inches long, is similar in body form, but has a smoky-grey belly.

Fig. 12. **Meadow Mouse,** 6¾ inches long, when adult; has short ears and tail, and small eyes.

**Cooper's Lemming Mouse,** 4¾ inches long, is similar externally to a **Meadow Mouse,** hind foot about the same but has a shorter tail Fig. 12 (a).

**Red-backed Mouse,** 5½ inches long, is similar, but has a red band on the back.

Fig. 13. **Jumping Mice** are brown and tawny above, white below, with very long hind feet and tail.

Fig. 13(a). **Woodland Jumping Mouse,** 8¾ inches long, has a white tip to its tail; the **Meadow Jumping Mouse,** 8½ inches long, does not. Fig. 13 (b).

### WEASELS

The three weasels are distinguished by size, and the amount of black in the tail. (The males are about 1/3 larger than the females).

Fig. 14. **Least Weasel,** about 7 to 8 inches long, has no black tip to its tail.

Fig. 15. **Short-tailed Weasel,** about 11 inches long (male), 9½ inches long (female), has a moderate black tip to its tail.

Fig. 16. **Long-tailed Weasel,** about 16 inches long (male), 13 inches long (female), has a long black tip to its tail.

### RABBITS

Fig. 17. **Snowshoe Rabbit,** about 18 inches long, with big ears and feet, turns white in winter.

Fig. 18. **Cottontail Rabbit,** about 16 inches long, has smaller ears and feet, and does not turn white in winter.

## CURRENT LITERATURE

THE ALPINE FLORA OF THE EAST SLOPE OF MACKENZIE MOUNTAINS, NORTHWEST TERRITORIES, *By A. E. Porsild. National Museum of Canada, Bull. No. 101: 35 pps., 10 pls., 1 fig. (map). 1945.*

The author of this paper made a hurried reconnaissance trip along the northeastern half of the Canol Road, from Macmillan Pass to the Mackenzie River, N.W.T., and back again. Although the journey was made too late in the season (Sept. 5 to 10, 1944) for general collecting, some specimens were taken and numerous notes made on the vegetation.

The first part of the paper contains descriptions and photographs of the physiography and vegetation of the country along the portion of the Canol Road traversed. This is followed by a catalogue of the species collected (specimens cited) and noted by the author, supplemented with records from a collection made by Prof. V. C. Wynne-Edwards in July, 1944. This latter collection was made in the vicinity of Bolstead Creek, approximately half-way between Macmillan Pass and the Mackenzie River.

The catalogue contains about 255 entities, including one new species in *Papaver*, one in *Antennaria*, a new variety of *Saussurea angustifolia*, and a new combination in *Senecio*. Two shorter lists of plants contain citations of specimens also collected by V. C. Wynne-Edwards from (a) Lone Mt. and Mt. Nahanni and (b) various localities along the Mackenzie River below Great Slave Lake.

It is useful to have this material on record, for the paper contains "many important additions to the known flora of the Northwest Territories, not to mention numerous important range extensions."— J. H. SOPER.

# OBSERVATIONS ON SOME NEWFOUNDLAND SEA-BIRDS[1]

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## INTRODUCTION

THE AUTHOR has been engaged in Fisheries Research in Newfoundland since 1938 as a summer occupation. In 1939 while engaged on lobster research in Placentia Bay some notes on sea birds were recorded and particularly in 1940 while engaged in research on cod at Fogo and in trips between St. John's and Fogo on the research boat "Miss Kelvin" observations on sea birds were made whenever possible. Since our fisheries research could not be interfered with for observations on birds it is hoped that the ragged nature of some of these observations will be excused. In particular we were unable to take time to survey islands where birds appeared to be nesting. Some accounts in old Newfoundland histories also add somewhat to the local historical background of the great auk, the gannet and the puffin, while from several large classes of teachers in training as a part of Nature Study classes at the Memorial University College and from our own experiences around the coast information on local names of sea birds and on some local sea bird colonies has been obtained. Many of these student teachers are keen observers and have been shooting scores of sea birds per year for many years. They are selected from all parts of the island and our settlements are almost all near the shore. No attempt has been made to cover the local sea birds exhaustively but only those to whose local life history it is hoped we can add some details.

The local names of Newfoundland sea birds are very interesting. In the early centuries after the discovery of Newfoundland, the harbours contained a strange mixture of English, French, Basques and Portuguese. Both French and English settlements existed. Later the French assumed control for fishery purposes of the northeastern and the western half of the coastline and the English the southeastern and southern portions. As the English and Irish settlers gradually colonized the whole coast they brought many common names with them, often for somewhat different birds. Many names also they learnt from French or other fishermen and corrupted them so that the origin is in many cases impossible to trace. For centuries most of the fishermen to whom all the common names of sea birds are due since they alone are in constant contact with them, were almost or completely illiterate and the names have been passed on by word of mouth. The different origins of settlers in various localities and their relative isolation in these localities for centuries with little formal education allowed various local names for the same bird to develop and be retained in different parts of the island. Since these names are rarely spelt, a dozen spelling variations exist for each local name; for example, out of 35 teachers in training from different parts of the island writing on the tern, 5 called it 'stearin', 4 'sterin', 4 'stearn', 4 'stern', 4 'stairn', 3 'steerhen', 2 'steering', 1 'stearen', 1 'steerin', 1 'steron', 2 'paytrick', 1 'patrick', 1 'pederick", 1 'paterick' and 1 'patriach'.

The author has been familiar with many of these common names of these various sea birds since his childhood in Bonavista.

While a number of ornithologists have visited the Newfoundland bird colonies it must be remembered that the figures given for the numbers of birds present are usually pure estimates. Almost never has enough time been spent to take a real bird census of an island and some of the nesting places are almost or completely inaccessible in so far as the counting of nests or eggs is concerned.

### Greater Shearwater *Puffinus gravis*.—

### Sooty Shearwater. *Puffinus griseus*.—

On June 30, 1939, on the south coast of Newfoundland in Placentia Bay from four to ten miles off Placentia we observed from ten to fifteen thousand shearwaters of these two species, greater shearwaters being far the more numerous. These shearwaters lay in flocks roughly parallel with the shore and from 3 to 4 miles offshore. Several were observed eating caplin which were then near the shore in great numbers. Local people say that the

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[1] —Received for publication November 10, 1944.

shearwaters enter this bay after caplin and then leave with the caplin. The caplin spawn in numbers on the beaches in Placentia Bay from about the second week of June to the first week in July and the survivors swim offshore into deeper water. Many die from the effects of spawning and float offshore in a dead or dying condition to be eaten by the gulls, terns, shearwaters and other sea birds. The local observers are apparently correct since in continuous almost daily boat trips in and around Placentia Bay north of a line from Placentia to Flat Islands from July 25 to August 15, 1939, we saw only one shearwater, a greater shearwater, almost 3 miles from the bottom of the bay at Arnold's Cove on August 9. Shearwaters were, however, present in August near the mouth of Placentia Bay.

On June 30 while passing through these large flocks of shearwaters in Placentia Bay we noticed very large numbers of floating shearwater feathers. Evidently a wing moult was in progress among the greater shearwaters. Wynne-Edwards (1935-A) states that on June 23 he saw floating in the North Atlantic enormous number of quills and contour feathers from moulting greater shearwaters.

In 1940 from June 12 to 29 in boat trips between St. John's and Fogo and in fishing off Fogo we observed whenever possible the populations of greater and sooty shearwaters. The totals, in cases in which the proportions could be observed were about 1100 greater shearwaters and 35 sooty. In several large flocks the figure of greater shearwaters was necessarily an estimate. The sooty shearwaters were usually intermingled with the flocks of greater shearwaters. Wynne-Edwards (1935-A) in his Atlantic crossings counted 3200 greater and 29 sooty shearwaters.

Evidently at Fogo also the shearwaters were attracted toward shore during the caplin spawning which occurs from about the fourth week of June to the second week of July in this area. In addition to small groups seen daily while fishing five or six miles off Fogo, on June 20, hundreds of shearwaters were seen and several hundred again on June 24, four or five miles off Joe Batt's Arm. On a trip from Funk Island across the mouth of Bonavista Bay to Bonavista on June 29 we saw more than a thousand shearwaters in many small flocks. Again on July 22 about 4½ miles E by N of Little Fogo Islands numerous greater shearwaters and a few sooty were seen.

On August 5 to 6 in our trip from St. John's across the mouths of the bays to Fogo we saw very few shearwaters. Only five or six were observed. On August 8, 4½ miles off Little Fogo Islands, only 6 shearwaters were observed and on August 9 in the same locality only 3 sooty shearwaters and no greater. On these two dates the scarcity of shearwaters and sea birds generally on the fishing grounds was very noticeable, not one one-hundredth of the birds that were present in June during the caplin season. On September 7 numerous shearwaters were observed in flocks of 20 to 30 off Bonavista and flying south. On September 18, fifteen greater shearwaters were seen in a trip between Baccalieu Island and Fogo.

Four greater shearwaters and two sooty were collected in June. The stomach of one greater shearwater collected June 14 off Cabot Island contained 11 cephalopod beaks about six millimetres long and a large quantity of semi-digested caplin. Similarly the stomach of a sooty shearwater collected off Cabot Island on the same date contained 6 small cephalopod beaks and a small amount of semi-digested caplin. Squid do not arrive in Newfoundland waters before August and no other cephalopods are present. These beaks therefore must have been brought from more southern waters.

Usually off Fogo the shearwaters remained 4 or 5 miles offshore and only once in stormy weather on June 26 did we see any within half a mile of the Island. Numerous local observers agree that the shearwaters only come close to shore and are thus much more numerous on the inshore fishing grounds during foggy and rough weather. Especially during foggy weather they come close to the fishing boats and are killed with long poles with hooks on the tip, and are caught with trouthooks using cod liver as bait. These birds are commonly eaten by the Newfoundland fishermen and tens of thousands of them are killed yearly, some shot but most killed by the above methods. They are usually skinned before cooking. One of our teachers in training from Braggs Island, Bonavista Bay, says of the shearwaters "They form another great hindrance to fishermen for during caplin school there are thousands around the bay and as the fishermen bait their trawls they rob the bait before the hooks can sink. I have taken thirty-two off trawls myself in one day for when they dive after the caplin on trawl hooks they get themselves hooked up and drown. They usually land on the water during fine weather but during foggy weather they are constantly flying around. I have caught over one hundred on a trout hook, it is great sport and during caplin school, especially foggy weather we go out especially for this purpose."

The shearwater is locally known as the 'bawk' or 'bauk', the greater shearwater being called the 'white bawk' and the sooty shearwater the 'black bawk'. In a few localities it is also called the 'hagdown' but from the common habit of dropping the 'h' the bird is oftener called the 'eggdown'. To illustrate the confusion of spelling, in an essay where our students were asked to write on the shearwater using local names, one called the bird the 'hagdown', three the 'eggdown', five the 'bauk', six the 'bawk' and three the 'balk'.

Newfoundlanders prefer the sooty shearwater and say that it is much better eating than the greater. Consequently they always shoot at the sooty if there is one in a flock of shearwaters. Thus in proportion to their numbers many more sooty than greater shearwaters are killed locally.

### Atlantic Fulmar.

*Fulmarus glacialis glacialis.*— On our trip from St. John's to Fogo on June 12 to 13 we saw 1 fulmar, light phase, 4 miles S by W of Cabot Island. On June 20, 2 fulmars were observed near the Barrack Rocks off Fogo while on June 29 on our trip from Fogo to Funk Island and from thence to Bonavista we saw a total of ten fulmars all in the light phase.

Locally these birds are called 'noddys' or 'noddies' and several local observers say that the reason for this name is that they constantly nod their heads while flying. Most fishermen do not eat noddys but some say that they do and that noddy makes a delicious meal.

### Leach's Petrel.

*Oceanodroma leucorhoa.*— Petrels can usually be observed near shore only before, during or after a storm or in foggy weather. Then they are often numerous. On June 16, 1941, at Holyrood we counted along a quarter mile of beach 151 recently killed petrels all belonging to the above species. A local fisherman reported seeing large numbers of these petrels on June 13 when there was a strong N.E. wind blowing onshore on this beach. Before dark on this date there were a number of patches of these petrels a short distance from the shore. These petrels were possibly washed in by the sea while sleeping or blown onshore by the strong wind and being unable to get off were killed by the seas beating on the shore. Their feathers were not covered with oil.

Locally these birds are usually called 'careys' although 'carey chick' or 'mother carey's chick' or 'chicken' is used by some. In one locality it is called the 'pall carey' possibly from its dark colour.

Doubtless this species nests on hundreds of islands and headlands round our shore. Its habit of approaching and leaving its nest at night does not make its nesting place kown to the casual observer. Among other places, petrels are reported to nest on Little Fogo Islands; Baccalieu Island; Shag Rock near Safe Hr., Bonavista Bay; a small island near Greenspond; Iron Island off Burin; Goose Island near Calvert; several islands off the cove at Elliston; and North Cabot Island.

### Gannet.

*Moris bassana.*— When Jacques Cartier visited Funk Island in 1534 he apparently found gannets breeding there in large numbers. More recent visitors to the island, Peter Stuvitz in 1841, Professor J. W. Milne in 1874, do not mention the gannet (according to Gilliard, 1937) and Lucas (1890) says that no gannets were present when he visited Funk Island in 1887. Wynne-Edwards who sailed near the island in 1934, in a letter to the author says "I did not see any gannets on the Funks in 1934, but I cannot be absolutely sure that none were present. Had there been as many as 40 birds or even one-quarter of that number, I should unquestionably have seen some on the wing. Actually one adult and one immature were seen in the vicinity of Funk Island by me — a common combination seen in many places off Newfoundland and Labrador and just non-breeding wanderers. I rowed completely around Funk Island and did not observe any gannets. I do not see how I could have missed them, more especially since I went on the look out for a gannet colony." The author is certain that if nesting gannets had been present in the position observed by him in 1940 they could not possibly have been missed by Wynne-Edwards.

Gilliard who landed on Funk Island on July 20, 1936, found seven pairs of nesting gannets and estimated a total population of 40, mostly unmated (Gilliard, 1937).

The author visited Funk Island on June 29, 1940. Owing to a heavy sea we could not land but carried out observations from the deck of a small boat about a hundred yards off the island where the gannets weer apparently nesting in the middle of the murre nesting ground. There appeared to be about a hundred gannets on the nesting ground and from these and the numbers of gannets flying around the total gannet population of Funk Island at that time could hardly have been less than 200.

Gilliard thinks that this evidently new Funk Island gannet colony may have come from the Chimney Rock or Bird Island gannetry at Cape St. Mary's, but in our opinion it is more likely that these Funk Island gannets came from the long established gannet colony recently visited by Peters (1942) on Baccalieu Island. Gannets from Baccalieu Island could easily wander as far as the Funks on their ordinary feeding trips.

Regarding the presence of gannets in Newfoundland during the nineteenth century we have the following additional information: Sir Richard Bonnycastle (who as Lt. Colonel in the corps of Royal Engineers was stationed in Newfoundland and evidently possessed a good knowledge of birds since he speaks of many from his own observations) in his history of Newfoundland written in 1842 says "That immense sea bird, the lazy cormorant is also common on the desert rocky places of the coast particularly about Trepassey and to the northward; and so is another species of pelican the gannet or solan goose (*Pelicanus bassanus*)." Again in Hutton and Harvey's book on Newfoundland in 1883, page 197, it is stated "the stormy petrel, gulls in great variety, gannets, cormorants and the loon are common." Harvey was an excellent local naturalist and the statement is probably correct.

On the other hand Lucas (1890), who leaving St. John's for Funk Island on the morning of July 21, 1887, sailed northward toward Cape Bonavista, thus passing by Baccalieu Island, saw no gannets at all on the east coast of Newfoundland. Since gannets are very conspicuous birds, the Baccalieu colony possibly did not exist or existed in very small numbers in 1887.

Peters (1942) who visited the Baccalieu Island gannet colony in 1941 and estimated it at 200 nests, obtained from local residents the information that the colony had been there about forty years. Mr. Absalom Norris, however, who is over seventy years old and was born and has lived at Grates Cove near Baccalieu Island says that the gannets have been on Baccalieu Island ever since he can remember and that he has heard his father say that they were there as long as he could remember as well. This statement if correct is evidently good for somewhere between 80 and 100 years. Mr. W. B. Avery of Grates Cove in reply to a letter of inquiry replied "I have made inquiries and find out that gannets have been nesting on Baccalieu Island for over a century and in all probability centuries. The gannets leave during the month of November and return in April."

Apparently gannets did not nest on Funk Island from 1841 or earlier to about 1934-36 and Wynne-Edwards (1935B) from local information estimates that the Cape St. Mary's colony began between 1877 and 1883. The confusing evidence regarding Baccalieu Island indicates a long existing colony possibly centuries old on that island but the evidence may also indicate a desertion of Baccalieu Island possibly between 1875 and 1880, a colonization of Bird Rock at Cape St. Mary's and a return to Baccalieu Island of some of these gannets somewhere in the vicinity of 1900. The rapidity with which a gannet colony can grow is shown bv the considerable increase in the Funk Island gannets between 1936 and 1940.

As a rule gannets are not eaten locally although like other sea birds they may be occasionally used to some extent as bait for cod when other bait is scarce. The local superstition preventing people from eating them is that the gannet has a spot of poison under each wing. The old gannets also would be rather tough. To secure it for bait or more often for so-called amusement fishermen occasionally are reported to take advantage of the gannet's method of diving from a great height perpendicularly into the water for food. Attaching a fish to a board they place this on or slightly under the water and the gannet will dive for the food, breaking its neck on the board.

### Great Skua.

*Catharacta skua.*— While in the Fogo area from June to August, 1940, only three specimens of the great skua were seen, one which came within fifty feet of the boat near the Barrack Rocks on June 18, another on June 29 about half way between Fogo Island and

Funk Island. This skua was resting on the water in the midst of a flock of about forty mostly greater shearwaters. Another great skua was seen about 4½ miles east by north of Little Fogo Islands on July 22.

I have heard this bird called the 'sea hen' locally and also the 'grand goose'.

**Glaucous Gull.** *Larus hyperboreus.*
**Iceland Gull.** *Larus leucopterus.*
**Great Black-backed Gull.** *Larus marinus.*
**Herring Gull.** *Larus argentatus.*
**Ivory Gull.** *Pagophila alba.*

The herring gull, locally called the 'blue gull' or the 'bluey', is the most universally common Newfoundland sea bird during the summer time. Occasional specimens of the great black-backed gull, or the 'saddle-back' as it is locally known, can be seen also on most parts of the coast. One can hardly walk anywhere in Newfoundland within a few miles of the coast in the summer time without seeing herring gulls or occasionally saddle-backs flying to their nests on islands in the ponds often five to ten miles from the coast.

Colonies of herring gulls are also found on a number of coastal islands and cliffs. A large colony of herring gulls is reported to nest at Red Cliff Head about four miles north of St. John's and another large colony of gulls, probably mostly herring gulls, is reported by several observers to nest at Gull Cliff several miles inland from Western Bay.

During the winter time another gull reported by many local observers is called the 'ice gull', the 'ice partridge' or the 'slob gull', since it is usually noticed when ice is around. The gull called by any of these names is described usually as pure white and is no doubt often the ivory gull. Others describe the 'ice gull' or 'slob gull' as being white with a pale blue or grey back, evidently the glaucous gull or the Iceland gull. Doubtless to many observers all three of these species would appear white at least in comparison with the herring gull and the saddle-back. Apparently these species are not usually separated since all observers but one mentioned only one gull in addition to the herring gull and the 'saddle-back'. One observer from St. John's Bay on the north west coast describes the 'slob gull' as being as large as or larger than the saddle-back and light grey in colour (i.e. the glaucous gull) and also says that the gull called the 'ice-partridge' is about the size of a 'tickle-lace' (kittiwake) and is as white as snow with yellow bill and black legs (i.e. the ivory gull). Some of these winter gulls are also called 'duck-gulls' since they arrive with the sea-ducks (eider-ducks) and are reputed to steal the food of these ducks.

Aldrich and Nutt (1939) state that a few glaucous gulls were seen in Brigus Harbour but more near Cape St. Francis on Sept. 3, 1939.

Although we have altogether observed thousands of gulls, in Placentia Bay, 1939, along the east coast of Newfoundland from St. John's to Fogo in 1940 and in St. John's Harbour and near St. John's from 1940 to 1942, closely enough to determine the species, we have yet to see a glaucous gull in Newfoundland waters in the summer time. All gulls (apart from kittiwakes) seen closely enough to be identified were herring gulls or great black-backed gulls.

On February 19, 1940, I received a glaucous gull with a broken wing which had just been captured in St. John's harbour. This bird was 27.5 inches in total length, wing 18 inches, bill 2.3 inches long.

On March 16, 1941, crossing Cabot Strait from Port aux Basques to Louisburg on the S.S. Caribou I observed a flock of 24 glaucous gulls and one great black-backed gull. We were breaking our way through the ice and the glaucous gulls followed in the lane of water behind the ship. Occasionally they perched on the ice and waited for the ship to get further ahead. This flock followed the ship closely for at least several hours and could be readily identified as *Larus hyperboreus* rather than *Larus leucopterus* from their size and the fortunate presence of the great black-backed gull with which they were associated, the glaucous gull and the great black-backed gulls being both very large gulls of approximately the same size.

On December 29, 1943, I saw about a dozen glaucous gulls mingled with herring gulls in St. John's Harbour. Again the larger size was very evident.

Gulls are eaten locally by many of the fishermen and young gulls particularly are relished. Gulls are wary birds and more of the tamer young are shot than the old. Fishermen also catch them on hooks particularly by what is locally known as a "gly". Evidently this is derived from the French, "prendre à la glu (pronounced gly)" meaning to take with bird-lime, or to snare. According to one description the gly is made of a piece of cork about the size of a caplin, a hook and a squid or herring. The hook is fastened to the cork and the squid is pulled on over the hook and cork. Then the gly is anchored in the sea. When the gull eats the squid or herring, which it does in one mouthful, it gets caught on the hook.

In many localities it is a practice to visit gulls' nests on the islands of the ponds and take the young half-grown gulls, bring them home and raise them on fish and household scraps, clipping their wings until they have grown up, and then eating them. Sometimes tame gulls are kept and used as decoys in shooting the wild gulls.

**Kittiwake.**

*Rissa tridactyla.*— Kittiwakes were common in June, 1940, in Baccalieu Tickle, near Cabot Island, off Fogo and especially at the Funk Island where about a thousand were observed on June 29 mostly perched on one of the cliffs of the island.

Aldrich and Nutt (1939) say kittiwakes are fairly common, but not known to breed in eastern Newfoundland. Peters (1942) reports about 25,000 kittiwakes nesting on Baccalieu Island. It is reported also that kittiwakes nest on Goose Island off Calvert.

Wynne-Edwards (1935-B) says with regard to Cape St. Mary's "The ledges of the mainland cliffs are occupied chiefly by guillemots and kittiwakes."

Lloyd (1941), in reporting a kittiwake banded on the Island of Kharlov near the Murmansk sea coast, Barents Sea, U.S.S.R., on July 25, 1938, and caught during the autumn of 1939 in Bonavista Harbour, Newfoundland, states that this is at least the third kittiwake banded on the island of Kharlov that has been recovered in Newfoundland. The band was marked "MOSKWA 56371E". Since then we have received information from Mr. Reuben Parsons of Beaumont South, Long Island, Notre Dame Bay, that on or about January 31st, 1942, midway between Long Island and Little Bay Island, he shot a banded kittiwake. The aluminum band bore the marking "MOSKWA 87536E". According to Mr. Parsons the kittiwake bore the markings of a young bird.

Kittiwakes are commonly used for food in Newfoundland and are often regarded as the best sea bird for food with the exception of the duck and the murre. The birds are attracted by pieces of cod liver floating on the water or sometimes floating in a hoop which is towed a gunshot behind the boat. Also by waving the arms and imitating the call of the bird kittiwakes can be made to change their course and come toward the boat. Kittiwakes are especially common on the east coast of Newfoundland waters during the autumn months when on foggy or stormy days large numbers of them approach land close enough to be shot from the shore. They are always much tamer than the other gulls and tens of thousands are shot yearly for food. In some localities they are caught in numbers by small traps baited with cod liver and attached to floating pieces of wood. They are also caught with trout hooks, using cod liver as bait.

This bird is almost never called the kittiwake, the local name being "tickle-ace" or "tick-i-lace", a name which is probably the local interpretation of the call of the bird which elsewhere is interpreted as kittiwake. In some localities the kittiwake is also known as the lady or the lady-bird possibly from the snow white breast and the general clean and dainty appearance of the bird.

**Common Tern.** *Sterna hirundo.*—
**Arctic Tern.** *Sterna paradisaea.*—

On June 13, 1940, while passing South Cabot Island we saw several hundred terns on the island, apparently nesting there. On our visit to Funk Island on June 29 we saw about 500 terns near the island. Mr. Baxter Blackwood, the captain of our boat, found eight terns' nests on a small part of Barrack Rocks, off Fogo, on July 20, 1940, some with young just hatched others with tail feathers showing. The terns nesting here were Arctic terns. At least several hundred terns were nesting. One tern shot off Barrack Rocks on June 20 and another collected at Dean Hr., Little Fogo Islands, on August 7, were Arctic terns and eight shot by Blackwood at the Barrack Rocks nesting grounds on July 20 were recognized by him as Arctic terns with all red bills.

Similarly 8 terns which were closely observed at Dean Hr., Little Fogo Islands, on August 8 were definitely Arctic terns. These birds came within 10 to 20 feet of the boat while we were anchored. Also on August 8 while fishing at Jacob's Ledge about 4½ miles from Little Fogo Island about a dozen terns attracted by cod liver came close enough to the boat to be recognized as Arctic terns.

Measurements in inches of the Arctic tern collected June 14 were (measuring according to Chapman's (1932) directions) length 15.0, wing 10.6, tarsus 0.6, bill 1.3, tail 7.2, female, largest eggs diameter 6 mm., and in the Arctic tern collected on August 7 the tail feathers of which were shot away the measurements were — wing 10.4, tarsus 0.64, bill 1.32.

Lucas (1890) says that while Stuvitz (in 1841) was above all surprised at the abundance of the Arctic and the common tern at Funk Island and he himself found Arctic terns, still very numerous, breeding on the island, not a single specimen of the common tern was noticed during his visit in July, 1887.

Aldrich and Nutt (1939) say that on September 3, 1938, near Funk Island and on September 3, 1939, off Bay Bulls, common terns (2 birds in each case) were positively identified.

In view of the fact that immature Arctic terns have varying amounts of black on their bills and may be sometimes mistaken on the wing for common terns; Lucas' observations on the Arctic terns being the sole breeding terns on Funk Island; and our observations on the Arctic terns breeding off Fogo at Barrack Rocks and our collection and observation of Arctic terns but no common terns in the Fogo region, it is quite likely that most or all of the breeding terns in the Fogo to Funk Island area are Arctic terns.

These birds are never called terns in Newfoundland but almost always 'stearins' or 'stairns'. In Conception Bay they are usually called 'paytricks', 'patericks' or 'pedericks' The name 'stairn' or 'stearin' is certainly derived from the French 'sterne' since the French formerly controlled large sections of the island. The local name also is not greatly unlike the cry of the tern. Whether 'paytrick' or 'pederick' comes from 'perdrix' it is more difficult to say but it is not unlikely. The ivory gull is locally called the 'ice-partridge'.

One of our observers, Edgar Boland of Pincher Island, Bonavista Bay, who has had many years experience in shooting sea birds says that "every four or five years we see a black stearin about the same size as the ordinary stearin". He has only seen two or three of these altogether. Whether this is the sooty or the black tern it is difficult to say.

Great Auk.

*Pinguinus impennis*.— Our ideas of the time when the great auk disappeared as a breeding bird from Funk Island are very hazy, due to lack of definite records. Lucas (1890) gives three accounts of its disappearance, one that of Audubon, not however from his own experience, who in his work published between 1839 and 1844 says that the great auk is rare or accidental on the coast of Newfoundland and is said by fishermen to breed on a rock off the south east coast of the island; the second account that of a fisherman in the Salem Register and quoted in the Gloucester Telegraph for August 7, 1839, in which the great auk is spoken of as already exterminated and a third account by the Rev. William Wilson who resided in Newfoundland as a missionary from 1820 to 1834 and who wrote of the bird in 1864 that "Half a century ago the penguin was very plenty. The penguin is now but seldom seen, it is now all but extinct."

Grieve (1885) gives an account of the sighting on the Banks of Newfoundland in 1852 by Colonel Drummond Hay of a bird which he believed to be a great auk and of a letter from Mr. J. Macgregor of St. John's, Newfoundland, stating that a dead auk had been picked up in Trinity Bay in 1853.

Recently I have found in old Newfoundland histories some further references to the great auk which place the time of general disappearance as a breeding bird although possibly not complete individual disappearance several decades earlier than most of the above accounts.

Rev. Lewis Amadeus Anspach arrived in Newfoundland in October 1799 and remained until 1812. He was a magistrate of the island and a missionary for the District of Conception Bay. Anspach (1819) says of himself that "more important considerations led me to inquire minutely into Newfoundland's circumstances, interests, history, and laws. A collection of facts selected from a variety of respectable sources, and my own observations, committed to a diary, had in the course of thirteen years supplied me with a mass of materials." Anspach published his history of Newfoundland in 1819 but the details in it were collected in and refer to the period 1799 to 1812. Referring to the east coast of Newfoundland he says "There was formerly on this coast a species of birds of the diving genus, which, from their inability to fly, were always observed within the space between the land and the Grand Bank and were once so abundant as to several islands on the coast, but they are now utterly extinct. They were known by the name of penguins."

The geologist Jukes (1842) gives the following account of his visit in the Funk Island area in 1840. "Passing by some low rocks called the Penguin Islands we sailed through the islets called the Wadhams. Penguins were formerly so abundant on these shores that their fat bodies have been used for fuel; they are, however, now all destroyed, and none have been seen for many years. There are three low rocks thirty miles out to sea from Cape Freels, called the Funk Islands, whence several boat-loads of sea-birds' eggs are annually brought away."

**Razor-billed Auk.**

*Alca torda.*— In our trip from St. John's to Fogo on June 12-13, 1940, with almost continuous observations not a single razor-billed auk was seen. Lucas (1890) says of the Funk Island that the number of murres and razorbills was comparatively insignificant, and the few eggs of these species that were seen were placed in the most secluded spots attainable. While about 100 yards from Funk Island on June 29, 1940, we saw twenty to twenty-five razor-billed auks flying from the island and in the water nearby.

One razor-billed auk was observed about midway between Barrack Rocks and Little Fogo Islands on August 12. This bird flew around the boat nine or ten times. This was the only razor-billed auk seen this year on four return trips, St. John's to Fogo in June, July and August and during almost daily fishing about five miles off Fogo Islands in these three months.

This bird must be more plentiful during the winter time on the east coast of Newfoundland since the fishermen in general are familiar with the bird which they call the 'tinker'. Fishermen at Fogo in August 1940 stated that 'tinkers' were not uncommon in Notre Dame Bay during the late fall and winter. Some fishermen however call the *ringvia* form of the Atlantic murre the 'tinker' and the razor-billed auk the 'murr'.

**Atlantic Murre.** *Uria aalge aalge.*—
**Brünnich Murre.** *Uria lomvia lomvia.*—

Lucas (1890) who visited Funk Island on July 22, 1887, says that the number of murres was comparatively insignificant and the few eggs of this species that were seen were placed in the most secluded spots attainable. According to Johnson (1940) Lucas (1887:135) states "few murres on Funk Island to-day — twenty years ago one boat took away eleven barrels of eggs on one trip. This year it is much to be doubted if aside from the puffins there have been two barrel fulls laid on the Island."

Gilliard (1937) who landed on the Funk Island on July 20, 1936, estimated that there were approximately ten thousand breeding pairs of murres on the sloping, rocky, southwestern side of the island.

Aldrich and Nutt (1939) state that the murre found on the east coast of Newfoundland is Brünnich murre. They say "murres of this species, (*Uria lomvia lomvia*), are not uncommon off the east coast of Newfoundland in summer. At least a few scattered individuals were seen every day in that region. On July 13, 1938, when near the Funk Islands where Lucas (1890) found these murres breeding, and Gilliard (1937) estimated 10,000 breeding pairs, 20 were recorded by our party in a 2-hour period. Many were seen near Cape Spear on July 3, 1939. These murres are said to breed on Baccalieu Island."

In the published papers of Lucas (1890) and Gilliard (1937) the species of murre encountered at Funk Island is not mentioned.

Wynne-Edwards (1935) from field glass observations of the nesting birds at Cape St. Mary's in 1934 attributes the nesting murres in that area to the species *Uria aalge aalge*. Also according to a letter to the author Wynne-Edwards' estimate of the breeding murre population of Funk Island in 1934 was 10,000 pairs of Atlantic murres.

Peters (1942) who visited Baccalieu Island on the east coast of Newfoundland in 1941 estimated about 10,000 Atlantic murres (*Uria aalge aalge*) to be present.

In our coastwise trip between St. John's and Fogo Island on June 12 to 13, 1940, during which constant bird observations were taken we saw 4 murres 7½-9 miles N.N.E. of Cape St. Francis, 20 murres in Baccalieu Tickle and occasional murres from Baccalieu Island to a point 12 to 15 miles away in the direction of Catalina, 12 murres in the area 1½ miles off Elliston to 5 miles N. of Cape Bonavista, 49 murres from 15 miles to ½ mile S. by W. of Cabot Island. Occasional murres were seen all the way from Cabot Island to Gull Island (Cape Freels). No observations were taken from Gull Island to a point 4 miles from Peckford Island. Thirty-eight murres were observed from 4 miles S.S.E. Peckford Island to Peckford Island and occasional murres in the remainder of our trip to Cape Fogo. The murres were concentrated therefore in the neighborhood of Baccalieu Island and Funk Island. These murres were as a rule too far away for us to be able to determine the species but we have no reason to doubt that they were Atlantic murres.

During our almost daily cod fishing near Fogo in June 1940 many murres were seen closely enough to determine species and they were invariably Atlantic murres, many of the ringed type. These murres seen near Fogo almost certainly belong to the large colony at the Funk Island only about forty miles away. Four murres were collected from a flock of 30 observed 4½ miles S. by W. of Cabot Island (40 miles from Funk Island) on June 13. These four were all Atlantic murres and two of them were of the ringed variety. Two Atlantic murres, one of the ringed variety, were collected near Barrack Rocks (about thirty-five miles from Funk I.) on June 24. In our observations 100 yards off Funk Island and in 1940 we observed the large colony of murres nesting on the shelving rock. While we could not estimate their numbers at all accurately, it seemed probable that the murre population was in the vicinity of Wynne-Edwards' and Gilliard's (1937) estimate of 10,000 pairs of breeding murres. Of the birds which could be seen in this vicinity on land, in the air and in the water the murres appeared to be by far the most plentiful, as many or more murres than all the other species of birds together. Six murres shot within a hundred yards of Funk Island were all Atlantic murres, 3 of them of the ringed variety. Scores of murres which came close enough to the boat to be recognized were all Atlantic murres. It is fairly certain therefore that the murres breeding at Funk Island and the murres commonly encountered on the east coast of Newfoundland during the summer time are Atlantic murres and not Brünnich murres as stated by Aldrich and Nutt.

On July 20, while near Barrack Rocks we collected a young Atlantic murre of the year's hatching, 8.8 inches long. This young murre was closely accompanied by an adult Atlantic murre.

Invariably in Newfoundland the murre is called the 'turr'. The name Baccalieu bird is also applied to it in Conception Bay since they have bred for centuries in such numbers on the neighbouring Baccalieu Island.

The Brünnich murre is probably common on the eastern Newfoundland coast in fall, winter and spring and doubtless this is the bird which the fishermen call the 'northern turr' which they say is larger than the 'southern turr'. Almost all the birds of the murre type the fishermen call 'turrs', but occasionally they shoot a bird which they call a 'murr' or more usually a 'mer'.

I have obtained a number of descriptions of the 'mer'. The only things common to most of the descriptions are that it is much scarcer than the 'turr', possesses the turr-like form and colour, usually has a somewhat larger body and a white streak somewhere on its head. In some cases this streak is said to be along the bill, evidently the Brünnich murre, in other cases extending forward from the eye, evidently the razor-billed auk, and in still other cases around and extending back from the eye, evidently the *ringvia* form of the common murre. Usually however, both Atlantic and Brünnich murres are called 'turrs', the fishermen not noticing the small differences.

Locally murres are considered excellent food birds and are heavily hunted in the fall and spring and in the winter wherever they are present. Sometimes a single boat with two or three men kills fifty to one hundred murres in a day. Tens of thousands must be shot in this way each year. Since the war, large numbers of murres have been found locally with feathers stuck together with crude oil, unable to fly and in a starving condition.

The great increase in murres at Funk Island since the visit of Lucas is due to the changing habits of the fishermen. The number of schooners sailing from Newfoundland to the Labrador has been gradually reduced and in the last thirty years there has been a great reduction in the number of small schooners fishing in the vicinity of Fogo, the Wadhams and Peckford Islands. Owing to these changes and possibly to a lack of desire on the part of many of the younger generation for sea birds' eggs the Funk Island is now only visited occasionally by parties seeking eggs. Also owing to the presence of fewer fishermen and to some extent to the restrictive laws fewer murres belonging to this colony are killed during the summer time. This lack of disturbance of the birds on Funk Island in recent years has probably also led to the re-establishment of the gannet colony.

### Dovekie.

*Plautus alle.* — This bird which is very common along the east coast of Newfoundland during the late fall and early winter is naturally exceedingly rare during the summer season on this coast. Aldrich and Nutt (1939) report having seen one swimming near the vessel while off Cape Broyle on July 6, 1938. On August 17, 1939, we shot a dovekie about 10 miles south of Flat Island in Placentia Bay on the south coast of Newfoundland. The primaries and secondaries of the wing of this bird had moulted and were barely starting to grow again. The bird was unable to fly. This was the only dovekie seen during almost daily summer experimental fishing and research cruises in St. George's Bay and the west coast of Newfoundland as far as Flowers Cove in the summer of 1938, in Placentia Bay, 1939 and the east coast of Newfoundland from St. John's to Fogo, 1940.

Locally this bird is never called the dovekie but almost invariably the 'bullbird'. On parts of the south coast it is commonly known as the 'ice-bird'. In several settlements south of St. John's such as Calvert, Brigus South and Ferryland, the bird is called the 'gilly'. Possibly this is a diminutive or corrupted word for guillemot since these birds look like tiny murres or guillemots and the old settlers, Ferryland being one of our earliest settlements, almost certainly knew the word guillemot. From one locality, Cape St. George, I have received the name 'John Bull' for this species. Possibly this may be an indication of the origin of the commonly used name 'bullbird'. In Old Perlican according to another observer the name 'nunchie' has been applied to the dovekie.

'Bullbirds' are commonly eaten in Newfoundland but being so small are not so much pursued by hunters as the murres. They are very tame especially on frosty mornings when many of them are killed by pursuing in boats and batting them with long poles.

### Sea-Pigeon.

*Cepphus grylle.*— Aldrich and Nutt (1939) say regarding this species "Rooke (1935) states that he saw two off St. John's. No guillemots were recorded by our party, however, in the 3 years of observation on the eastern coast."

In spite of the above observation, however, breeding sea-pigeons are very common on the Newfoundland coast. Possibly Nutt's observations were from a ship passing too far away from the coast and the sea-pigeons are generally in the summer time relatively near their breeding places along shore. On our trip from St. John's to Fogo in June, 1940, we observed the following sea-pigeons:

| | |
|---|---|
| June 12 — ¾ mile offshore off Quidi Vidi | 1 |
| June 12 — ¼ mile off Green Point | 3 |
| June 12 — Off Burnt Point at the southern entrance to Catalina Harbour | 9 |
| June 13 — Off Flowers Point | 1 |
| June 13 — 1½ miles off Elliston | 1 |
| June 13 — 1 mile off North Bird Is. | 4 |
| June 13 — 1 mile off Cape L'Argent | 4 |
| June 13 — Off Cape Bonavista | 4 |
| June 13 — Green Island to Bonavista | 8 |
| June 13 — Near South Cabot Is. | 1 |
| June 13 — Off Wild Cove, Fogo Is. | 1 |
| June 13 — Off Round Head, Fogo Is. | 15 |

On August 7 while anchored in a little cove at Round Head, Fogo Is., we observed about thirty sea-pigeons in the cove only ten to twenty feet from shore or perched on the rocks. A bluff cliff rises here to about 200 feet and probably 30 or more pairs of sea-pigeons breed here around this head. No young pigeons were in the water yet. Sea-pigeons are most common in these little unfrequented coves with high cliffs, the birds being most plentiful during the breeding season only a few yards from the shore near high bluff cliffs particularly headlands.

In Placentia Bay in 1939 we first saw young sea-pigeons in the water on August 12 when several flocks of adults and young were seen near the southern end of Long Island. The young could barely fly, battering along the water. On August 17 we shot two young sea-pigeons over deep water near Flat Island. Both of these young sea-pigeons which were probably not more than a week off the nest possessed ticks attached to the ventral surface of the body especially near the cloacal opening. The younger and fatter sea-pigeon possessed 2 ticks and the slightly older but thinner pigeon possessed 9 large ticks about 8 or 9 millimetres long, also several smaller ticks. These ticks were sent to the U.S. National Museum and identified by Dr. H. E. Ewing as adults and nymphs of a species of *Ixodes*. These young sea-pigeons had no food in their stomachs.

On five mornings in July, 1943, we passed down the shore from St. John's northward 3½ miles to Sugar Loaf. We noticed that sea-pigeons were common all along the coast from

Quidi Vidi just north of St. John's to Sugar Loaf 3½ miles north. There are at least several hundred sea-pigeons nesting in this area and certainly hundreds of others along the next few miles of shore line containing many high cliffs. Most of the sea-pigeons here were within a few yards of the shore.

Neither Lucas (1890) nor Gilliard (1937) mentions the sea-pigeon at Funk Island nor did we record any in our visit there in 1940. We were not especially looking for sea-pigeons, however, and a few sea-pigeons among so many murres, puffins, gannets, terns and kittiwakes might not be observed. There are not, however, any very high cliffs at Funk Island similar to the usual breeding places of sea-pigeons.

Peters (1942) says there were about 750 sea-pigeons nesting on Baccalieu Island, most of them on the bold eastern side facing the sea.

Aldrich and Nutt (1939) say "A large breeding colony (of sea-pigeons) is reported by Wynne-Edwards (1935-B) at Cape St. Mary's". Wynne-Edwards, however, does not at all refer to sea-pigeons in this paper, the only references being to gannets and Atlantic murres. Wynne-Edwards, however, calls the latter guillemots and Aldrich and Nutt call the sea-pigeon the guillemot, hence the misquotation. Some sea-pigeons are, however, almost certain to be breeding in the cliffs near Cape St. Mary's.

Since tame pigeons are found in only a few localities these sea-pigeons are simply called 'pigeons' in Newfoundland. They are commonly eaten but very difficult to shoot from their habit of diving at the flash of a gun. It can as a rule be killed in the water only by firing when it is not watching or when it is casually dipping its bill in the water since it must raise its head again before diving. When the young 'pigeons' take to the water about the middle of August, unable to fly or dive well and tamer than the old 'pigeons', it is common habit in many localities to shoot many of them, or kill them with long poles.

On the Newfoundland coast wherever there are high cliffs coming boldly down into the sea there are almost certain to be some sea-pigeons nesting. Among other places they are reported to nest on Green Island, Bonaventure Head and Ireland's Eye Island and near Trinity North in Trinity Bay; at the Highlands a few miles north of Western Bay in Conception Bay; at Cape Bonavista; on an Island near Green Island, Bonavista Bay; on Flowers Island and in numbers at Silver Fox Island, Bonavista Bay; and at Goose Island near Calvert. Doubtless they nest in a hundred other localities around the island. Most of our students report for their home villages that pigeons breed locally in the high cliffs.

**Atlantic Puffin.**

*Fratercula arctica.*— In our trip from St. John's to Fogo Island June 12 to 13, 1940, our first puffins were encountered in the vicinity of Baccalieu Island where about 20 puffins were observed in Baccalieu Tickle. Occasional puffins were observed from Baccalieu Island to a point about 20 miles north of Baccalieu Island where 6 were seen. From this point no further puffins were observed, until we reached a point 5 miles S.E. of Cape Bonavista where a single puffin and another group of 12 puffins were seen. No puffins were encountered in our trip across Bonavista Bay until we passed South Cabot Island about seven miles S.E. of Cape Freels where we saw a total of about a hundred puffins on the island and in the water within several hundred yards from the island. Local fishermen report that puffins breed on South Cabot Island. This is not the Cabot Island marked on the chart and bearing a light-house, and called by the local fishermen North Cabot Island, but another island close by and to the south. Occasional puffins were seen all along from Cabot Island to Cape Freels. No observations were taken between Cape Freels to 4 miles S.S.E. Peckford Island. Passing close to Peckford Island on the south and in the vicinity of White Islands nearby a total of 35 puffins were seen. Here our observations ended. Puffins are reported by local fishermen to breed on Coleman's Island only a mile from Peckford Island and while passing the western side of Coleman's Island on July 26 several hundred puffins were observed on the island.

During our fishing off Fogo in June puffins were very scarce, much scarcer than murres; only 3 puffins were seen, 2 on June 20 and 1 on June 24.

In Sir Richard Bonnycastle's history of Newfoundland entitled "Newfoundland in 1842" the statement is made that "the puffin frequents in myriads the islands around Bonavista Bay."

Lucas (1890) on his visit to Funk Island states that the puffins exist in great numbers on this island. Peters (1942) reported 5,000 Atlantic puffins nesting at Baccalieu Island.

On our visit to Funk Island in June, 1940, we noticed many puffins in the water and flying off the island but since we did not land, could not estimate their numbers. They did not appear to be nearly as plentiful as the murres.

There are probably other small colonies of puffins on some of the many islands in Notre Dame and Bonavista Bays in addition to those above mentioned and the large colonies on the Funk Island and Baccalieu Island. We spent the whole of August, 1940, towing for lobster larvae in Placentia Bay and during this time we visited almost every part of Placentia Bay inside of a line from Burin to Placentia without seeing a single puffin. It is fairly certain there are no breeding colonies of puffins on the islands in this bay.

It has been reported to me that they breed in numbers on Great Island just north of La Manche.

This is one of the few sea birds whose local name agrees with the usual one and nearly always local people call this bird the puffin. It occasionally, however, receives other names such as "hatchet face' or 'hatchet bill' in a few settlements south of St. John's such as Brigus South and Ferryland and occasionally 'Baccalieu bird" in Conception Bay although this name is much more usually applied to the murre; the name 'sea parrot' is used occasionally and some of our fishermen who have been fishing in the French Canadian parts of southern Labrador sometimes call the bird the 'parakee" or 'parakeet' corrupted from the French word 'peroquet'.

The puffin in the summer time is localised near its breeding places some of which not above noted certainly exist along the eastern coast of Newfoundland. They are not as numerous as the murre during fall, winter and spring but numbers of them are shot and eaten since this bird is recognized locally as a good table bird.

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# RECOVERIES OF BANDED CHIMNEY SWIFTS[1]

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BECAUSE OF ITS HABIT of traveling in flocks and roosting in chimneys where it can be trapped easily in large numbers, the chimney swift (*Chaetura pelagica*) has been extensively banded, the number, according to Lincoln ('44), being nearly 375,000. As a result of such banding much has been learned about such aspects of its natural history as migration routes, speed of travel during migration, and longevity. However, not until late in 1943 was its winter destination discovered, when thirteen banded swifts were collected in the headwaters of the Amazon, in Peru. One of these birds, interestingly enough, had been banded in Kingston, Ontario, by R. W. Smith.[2] A report of these recoveries has been made by Lincoln (*loc. cit.*).

The following account is of two flocks trapped in London, Middlesex County, Ontario. In the late summer swifts become conspicuous in London as they collect in the evening to spend the night in certain large chimneys. Enough recoveries have been made of birds banded in these two flocks to give a fair indication of the area from which they came, as well as the route followed after leaving Canada.

On September 18, 1940, 120 chimney swifts were trapped and banded. Ten days later, on September 28, a larger flock was caught a few blocks from the place where the others had been captured. Of the 758 birds in this flock four were from the group banded on the 18th, two had been banded previously elsewhere, and 725 were given bands. Fourteen of the 845 birds banded in these operations have been subsequently recaptured.

The first bird reported after leaving London was taken at Knoxville, Tennessee, on October 5, twelve days after its release. During this interval it had migrated over five hundred miles. On October 12 another was picked up at Knoxville, and on October 13 one was taken at Nashville, Tennessee. No others were recovered that fall, but the following summer six were reported in Ontario, four of them in Middlesex County (at Byron, Denfield, London Township and Wardsville), and two at Blind River, on the north shore of Lake Huron. On September 1, 1941, one more bird was trapped at Knoxville. It is interesting to note that this bird was almost a month ahead of its 1940 schedule, when it was in London on September 28. In the summer of 1942 two more were recovered in Ontario, one at Hillsburg, Wellington County, and one at Chesley, Bruce County, found dead. In the fall of 1942 two were caught at Nashville,Tennessee, on October 11. No recoveries were reported in 1943 or 1944.

The two birds which had been banded prior to their capture in London had been originally trapped at Blind River, Ontario, on July 21, 1939, and at Macon, Georgia, on October 22, 1939, respectively.

It is possible that further recoveries of birds from these two flocks may be made, although Green ('40), who has data on 17,165 banded swifts, estimates that their average life span is four years. His record for longevity was one swift which was recaptured eleven years after being banded. However, it seems unlikely that further recoveries would alter the picture produced by those already reported.

Four of the birds retaken during the nesting season came from the area in which they were caught, while the other five recovered during the summer came from places farther north. The flocks therefore appear to have been composed about equally of birds which had bred in the vicinity of London and those which had bred farther north and had already begun their migration. Judging from the fact that during the southward flight only two birds were recaptured together, the flock does not long retain its identity. This is also suggested by the manner in which the flock forms at the chimney — by birds arriving from all directions rather than en masse.

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[1] —Received for publication November 23, 1944.

[2] —Pilot Officer Ronald Ward Smith, R.C.A.F., was killed on active service overseas, September 11, 1944.

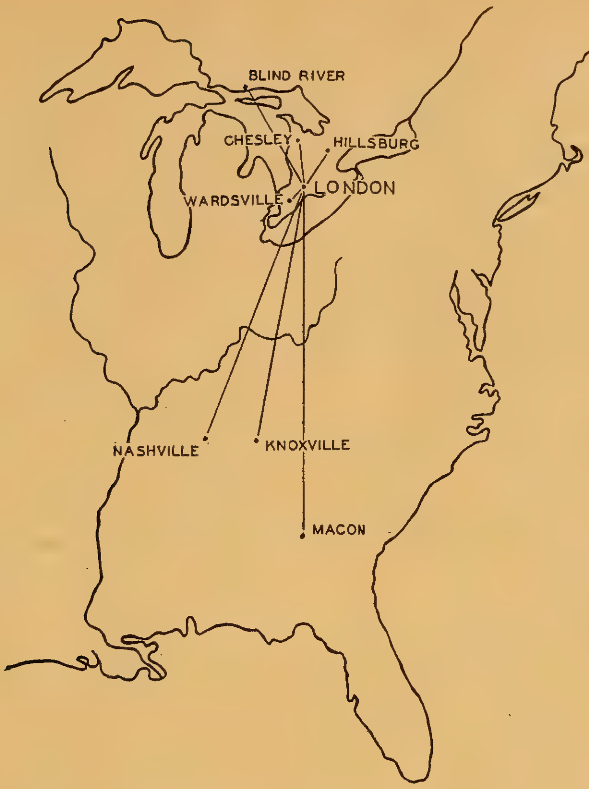

Figure I. — Map showing where swifts trapped at London, Ontario, have been found.

## NOTES AND OBSERVATIONS

THE FREE-TAILED BAT, *Tadarida macrotis*, IN BRITISH COLUMBIA.— *Tadarida macrotis* (Gray) inhabits an extensive range in South and Central America, but north of the Mexican-United States boundary it is one of the scarcest of North American bats. When Borell (Journ. Mammal. 20 (1) : 65-68) in 1939 published an account of the first colony to be discovered in the United States he was able to find only 8 previous records from north of the Mexican boundary. These were one each from Arizona, Nevada, Utah and Colorado and two each from California and Iowa.

The capture of a specimen of this species at Essondale, closely adjacent to New Westminster, B.C. in November, 1938 establishes a new northern record for the species and it also puts this bat on the Canadian list for the first time.

The bat flew into an open hospital window, was captured and brought to Professor G. J. Spencer of the University of British Columbia Department of Zoology. It was preserved in alcohol but in 1942 I removed the body and prepared skull and skin. These are now in the Museum of Zoology of the University of British Columbia.

The present specimen is that referred to by Spencer in an earlier paper (Proc. Ent. Soc. B.C. 36, 1940) as the California Mastiff Bat, *Eumops perotis californica* (Merriam). —IAN MCT. COWAN, University of British Columbia, Vancouver, B.C.

# OTTAWA BIRD RECORDS, 1944 [1]

*By* A. E. BOURGUIGNON
*Ottawa, Ont.*

IN A RECENT NUMBER of The Canadian Field-Naturalist (1944, Vol. 58, No. 5, pp. 143-175) Mr. Hoyes Lloyd has consolidated the Ottawa District bird records up to Feb. 29, 1944. A total of 255 species was listed.

During 1944 a number of records have come to hand, some of which add to the knowledge of previously recorded species, and three of which add new species to the list, making the present total for the district 258 species.

**Squatarola squatarola.**
BLACK-BELLIED PLOVER.— Thirteen birds were recorded in May. In October they were fairly common, the biggest flock occurring on October 1, when 33 were seen in one group. The species was noted on numerous other occasions.

**Arenaria interpres morinella.**
RUDDY TURNSTONE.— On May 28 at Britannia, Ontario, shore of Lake Deschênes, one was taken, the first Ottawa specimen, and presented to the National Museum. On May 31 nineteen were seen in a flock in the same vicinity, and two were taken for my collection. On June 1st three birds were found there, one specimen being taken for the Lloyd collection.

**Calidris canutus rufus.**
AMERICAN KNOT.— Additional occurrences for this species in the district are as follows: May 29, four seen; June 1, two seen by Mr. Lloyd, Mr. Patch and the writer; June 2, two seen; June 4, one seen.

**Pisobia fuscicollis.**
WHITE-RUMPED SANDPIPER.— Three were seen at Britannia on Aug. 16, an early fall date, and five on October 25.

**Pisobia bairdi.**
BAIRD'S SANDPIPER.— On August 23, Mr. Lloyd and I collected two specimens from mixed flocks of small sandpipers at Britannia.

**Pelidna alpina sakhalina.**
RED-BACKED SANDPIPER.— Twenty-two individuals were seen between May 21 and 31, at Britannia. On June 1 Mr. Lloyd, Mr. Patch, and I saw four and took two specimens; on June 2 I saw two more. Fall records were noted as follows: October 4, one; 8, two; 12, one; and 25, two.

**Micropalama himantopus.**
*Stilt Sandpiper.*— On Sept. 13 I took one at Britannia, shore of Lake Deschênes, the first record for the Ottawa district.

**Lobipes lobatus.**
NORTHERN PHALAROPE.— One was taken on August 16 at Britannia, having been selected from a mixed group of shorebirds, by Mr. Lloyd and me. Another was seen by me on September 20.

**Dendroica discolor discolor.**
NORTHERN PRAIRIE WARBLER.— When Dr. A. L. Rand and the writer were on the shore of Lake Deschênes, Britannia, Ontario, on May 17, a single example of this species was seen in an oak tree, and collected. It proved to be of this species and is the first record for the Ottawa district.

**Thryothorus ludovicianus ludovicianus**
CAROLINA WREN.— Mr. Hoyes Lloyd tells me that one was about his residence in Rockcliffe in September and October, and one, probably the same bird, was collected by Mr. Lloyd near the eastern limits of the City of Ottawa on October 30 and is now in his collection.

## NOTES AND OBSERVATIONS

BIRDS OF OTTAWA, 1944, AN INADVERTENT OMISSION.— *Fratercula arctica arctica* (Linnaeus). ATLANTIC PUFFIN.— Accidental; one record. A young bird was shot on the Ottawa River late in October 1881 (*See* Trans. O.F.N.C., 4, 1882, p. 85).

The total number of species in the 1944 list (Can. Field-Nat., 58, p. 143 (1944) was 255. Mr. Bourguignon in the above paper adds 3, and the present item brings the list of Ottawa birds to 259.— HOYES LLOYD, Ottawa.

---

[1] —Received for publication February 7, 1945.

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VOL. 59 SUTTON WEST, CANADA SEPTEMBER-OCTOBER, 1945 No. 5

# WATER BIRDS OF THE NIAGARA [1]

## [A HISTORY AND LIST OF AQUATIC BIRD-LIFE ON THE NIAGARA RIVER]

*By* R. W. SHEPPARD
*Niagara Falls, Ont.*

THE NIAGARA RIVER, with its world famous cataracts, is probably one of the best known waterways on the North American continent, and through the years since Father Hennepin first set eyes upon its beauty much of interest has transpired along the great stream and upon its banks. Well known as the River may be in many other ways, the very varied, and fascinating water-fowl life of Niagara does not appear to have received the attention it deserves from the general historian. This great waterway connecting Lakes Erie and Ontario is an important highway for large flocks of migrating swans and geese; an open water refuge for overwintering ducks and gulls from the North; a summer home to herons and terns, from the South, and a resting place in spring and autumn for many aquatic birds travelling to or from the North, South, East, and West.

Its zoo-geographical location, apparently between the Transition and Upper Austral life zones, places the Niagara in a particularly favourable position to receive uncommon stragglers from all points of the compass, and its banks and waters have on occasion been visited by such rarities as glossy ibis, American egret, and white pelican from the South or West; eider duck, murre, and gannet from the Eastern Maritimes, and skuas, jaegers, and rare gulls from the high North.

In its thirty-five mile course from Lake Erie to Lake Ontario, the Niagara River drops 326 feet. From Lake Erie, at 572 feet above sea level, the giant stream, divided by several large islands, flows for nearly twenty miles between low shelving banks, and in all that distance, to the edge of the upper rapids, there is a drop of only 10 feet. In the mile long stretch of the upper rapids themselves the River drops about 55 feet before reaching the crest of the Falls, which are divided by Goat Island, and vary in height from 162 feet to 167 feet. Immediately below the Falls, the Niagara, entering the gorge, is about 1,000 feet in width, and is nearly 200 feet deep for a distance of about two miles until the lower rapids are reached. From the beginning of the lower rapids, the River, roaring through a chasm from two to three hundred feet deep, drops approximately 100 feet in a distance of about seven miles, and then leaving the gorge flows on between moderately high banks for another six or seven miles as a comparatively placid navigable stream, until it reaches Lake Ontario, at 246 feet above sea level.

The previously published water-fowl records of the Niagara are only to be found scattered over a period of many years and throughout a great diversity of literature, and in this attempt to assemble such information as we have under one heading, I have drawn freely upon the carefully selected records of E. H. Eaton's 'Birds of New York', as well as from the more random notes in Rev. J. Hibbert Langille's fascinating little volume 'Our Birds in their Haunts'. The files of the 'Auk', the 'Canadian Field-Naturalist' and the 'Prothonotary', have also yielded many records of value, and while searching the first named journal, I came across a most entertaining note by Phillips (1929) entitled "An Early Account of the Destruction of Birds at Niagara Falls" which is so very appropriate to this occasion that it deserves quoting at some length:- "To an edition of John Bartram's 'Observations on the Inhabitants, Soil, etc., in his Travels from Pennsylvania to Onondaga, etc.' (London, 1751) there is added a curious account of the cataract of Niagara by Peter Kalm, a Swedish "Gentleman who travelled there" and on p. 807 occurs the following:- "Several of the French gentlemen told me, that when birds come flying into this fog or smoak of the

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fall, they fall down and perish in the water; either because their wings are become wet, or that the noise of the fall astonishes them, and they know not were to go in the dark; but others were of opinion, that seldom or never any bird perished there in that manner; because, as they all agreed, among the abundance of birds found dead below the fall, there are no other sorts than such as live and swim frequently in the water; as Swans, Geese, Ducks, Water-hens, Teal, and the like. And very often great flocks of them are seen going to destruction in this manner: they swim in the river above the fall, and so are carried down lower and lower by the water, and as water-fowl commonly take great delight in being carry'd with the stream, so here they indulge themselves in enjoying this pleasure so long, till the swiftness of the water becomes so great, that 'tis no longer possible for them to rise, but they are driven down the precipice and perish. They are observ'd when they draw nigh the fall, to endeavor with all their might, to take wing and leave the water, but they cannot. In the months of September and October, such abundant quantities of dead water-fowl are found every morning below the fall, on the shore, that the garrison of the fort for a long time lived chiefly upon them.--"

In compiling this list of Niagara's water-birds, which has been assembled from a variety of sources, it has been considered advisable, notwithstanding many misgivings, to adhere strictly to the nomenclature of the A.O.U. Check-list (1931) even though such adherence has meant resorting in some instances to supposition, and the recording of the most probable form. For drawing my attention to some of the older Niagara River records, I am indebted to James L. Baillie Jr. of the Royal Ontario Museum; to P. A. Taverner, formerly of the National Museum of Canada, and to the late J. H. Fleming of Toronto. In connection with a number of the more recent records, and the present day status of many species, my own notes have been compared with, or supplemented by, information obtained directly, or indirectly, from James Savage, H. D. Mitchell, and other prominent members of the Buffalo Ornithological Society, to whom my thanks are extended.

A total of one hundred and six separate species or forms, of which about five or six may be considered as having only hypothetical status on the River, are included in this account of Niagara's aquatic bird life.

**Common Loon.**

*Gavia immer immer* (Brunnich).— A regular visitor during both migrations. During October and November it is apt to be quite common both above and below the Falls; individuals occasionally overwinter on the River. In the spring, it is not of such frequent occurrence, but may be looked for with reasonable assurance during the later part of April, or early in May, at which time birds in full breeding plumage, and very occasionally large aggregations up to thirty in number, may be seen.

**Red-throated Loon.**

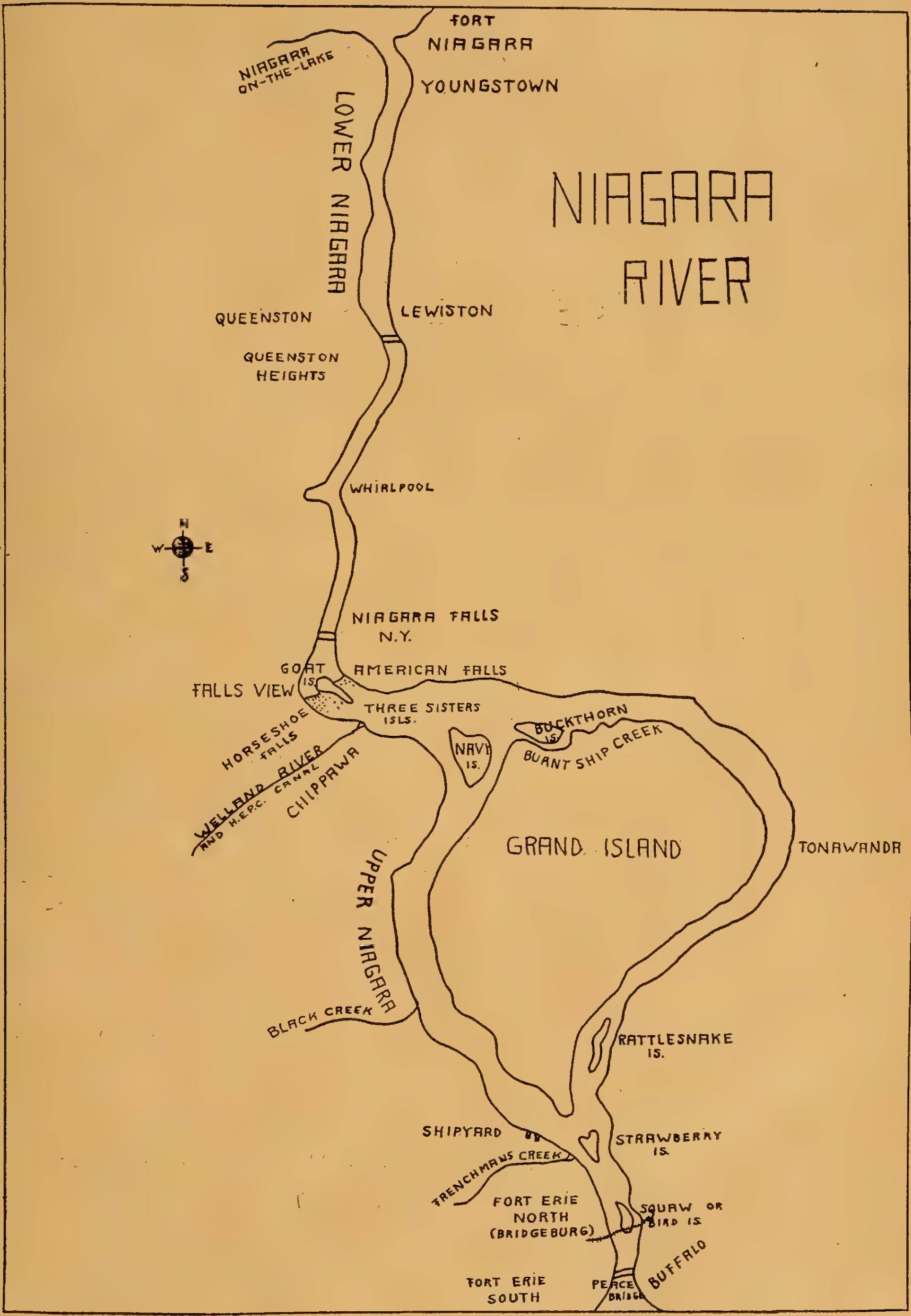
*Gavia stellata* (Pontoppidan).— Although stated by Eaton (1910) to be fairly common on Lake Ontario, this is a rare bird on the Niagara River. According to a list of specimens kindly supplied to me by the late Mr. J. H. Fleming of Toronto, Walter Brett took a female bird of this species at Niagara Falls, Ontario, on March 26, 1888. Of late years, there have been several sight records from the Niagara reported in 'The Prothonotary' (1935-39); but I have been unable to find records of any further specimens from the River.

**Holboell's Grebe.**

*Colymbus grisegena holboelli* (Reinhardt).— Rare. The late J. H. Fleming's list of the Walter Brett collection contains records of the following specimens taken at Niagara Falls:- a male on December 8, 1888; a male on Nov. 9, 1889; an adult female on April 29, 1890, and a female on November 1, 1890. Blain (1904) picked up a fine adult male on the Canadian side of the Niagara River opposite the American Falls on September 20, 1903.

**Horned Grebe.**

*Colymbus auritus* Linnaeus.— Very common, sometimes abundant on the river during both spring and autumn migration. Usually occurs in greater numbers during the autumn, but in some years very plentiful in spring, when birds in full breeding plumage are frequently encountered. On April 18, 1937, a flock of about fifty horned grebes in the river immediately below the Falls, contained at least 50% full plumaged birds while many of the remainder were in a transition stage. Langille (1884) writes of this species as being common at the latter end of April and the beginning of May and mentions flocks of hun-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FORT ERIE NORTH (BRIDGEBURG)
SQUAW OR BIRD IS.
BUFFALO
FORT ERIE SOUTH
PEACE BRIDGE

dreds in the lower River. According to the late J. H. Fleming, the Walter Brett collection contains three females taken at Niagara Falls, on May 5, 1889.

**Pied-billed Grebe.**

*Podilymbus podiceps podiceps* (Linnaeus).— Although not uncommon in adjacent territory, in marshes and other areas more suited to its habits, it is comparatively rare on the Niagara River proper. A solitary individual, with the well marked parti-coloured bill of the breeding season, was seen on April 17, 1936, swimming close to shore in reedy shallow waters a short distance above the mouth of Black Creek. A very late bird was observed in the more sheltered river waters of a power station intake near Dufferin Islands on December 8, 1938. The Fleming list of the Brett collection records two male pied-billed grebes taken at Niagara Falls in November, 1890. According to records in 'The Prothonotary' (1938), this grebe has been found nesting on Rattlesnake Island near Tonawanda and occurs on Grand Island.

**White Pelican.**

*Pelecanus erythrorhynchos* Gmelin.— A rare straggler; only one record. James Savage (1895) gives an account of a white pelican shot on the Niagara River near the International Bridge, between Bridgeburg and Black Rock, on October 5, 1894.

**Gannet.**

*Moris bassana* (Linnaeus).— A very rare straggler; only once recorded from the Niagara River. Mitchell (1934) reports an immature gannet near the Peace Bridge on October 29, 1933, and mentions the earlier capture of an example in adjacent territory in November, 1907.

**Double-crested Cormorant.**

*Phalacrocorax auritus auritus* (Lesson).— An uncommon migrant in the general area (Eaton, 1910), but some years ago I recorded several observations of this species upon the Niagara, (Sheppard, et al, 1936) and subsequently have observed it on one or two other occasions. The files of 'The Prothonotary' (1935-36) contain a moderate number of autumn records, ranging from August to December; but the apparent scarcity of spring records should tend to make the following extract from my diary, under date of May 18, 1936, of some particular interest:— "Examined a double-crested cormorant in William's yard on the River Road. The bird in breeding plumage was taken out of the whirlpool by a young man named Wright about two weeks ago."

**Great Blue Heron.**

*Ardea herodias herodias* Linnaeus. A familiar sight along the Niagara from April to October, this heron will occasionally linger on through November into December, and once in a while an individual will spend the whole, or the greater part, of a winter on the River. During the late summer months, about sunset time, these birds are very much in evidence, and it is then not uncommon to see as many as twenty or more in the shallows along the shore line while driving between Fort Erie and Chippawa. This heron nests in some numbers on one or two of the larger islands in the River. Shadle (1931) has given us an interesting account of a very large heronry on Grand Island, N.Y., and more recently I have been given to understand by officers of the Royal Canadian Mounted Police that there is a smaller heronry on Navy Island, Ontario.

**American Egret.**

*Casmerodius albus egretta* (Gmelin).— Although recorded by Eaton (1910), and many others since, as a sporadic summer visitor to adjacent territory, the report by Sheppard et al (1936) of two individuals on the Ontario side of the River about five miles down from Fort Erie, in August 1933, would appear to be the first published account of this species on the Niagara River. There are however a few reports in 'The Prothonotary' (1935-38) of occurrences on the River, notably one near Frenchman's Creek on May 15, 1935 (Savage); one seen on September 8, 1937 in West River, Grand Island, and another on Grand Island on April 30, 1938.

**Snowy Egret.**

*Egretta thula thula* (Molina).— Hypothetical; although Eaton (1910) states that Dr. Bergtold's list reports a specimen or specimens from Buffalo, he does not give any indication as to whether the record, or records, should be attributed to the River, the Lake, or some nearby inland point.

**Eastern Green Heron.**

*Butorides virescens virescens* (Linnaeus).— This small heron is occasionally seen during the summer months feeding in shallow reedy waters of the River between Black Creek and Fort Erie. Arriving somewhat late in April and lingering on into October, and more rarely as late as November, the green heron is a reasonably common breeding bird in the general area, but it is essentially a bird of the creeks and smaller streams, and its appearances on the broad reaches of the Niagara are apt to be comparatively rare.

**Black-crowned Night Heron.**

*Nycticorax nycticorax hoactli* (Gmelin).— Due to its more nocturnal habits, the black-crowned night heron is not so familiar a bird on the River as is the great blue heron, but in actual numbers present, this smaller species exceeds the larger, more conspicuous, bird to a marked extent. Shadle (1931) writes of counting well over a hundred nests which he believed to belong to this species in the Grand Island heronry; while of more recent years members of the Buffalo Ornithological Society have reported, in 'The Prothonotary' (1938), numbers up to three and four hundred birds in the early spring, in the Tonawanda and Grand Island swamps. On the Canadian side of the Niagara River, it has been observed on numerous occasions feeding after sunset, in the shallows along the River bank between Chippawa and Fort Erie, and it is a common sight of a summer evening to see this bird passing high over the city of Niagara Falls on its way to the River from some inland nesting, or resting, point. According to information received from Mr. G. H. Laidman, it is common at Queenston, and on May 24, 1938, the author saw as many as thirty in the air at one time near Niagara-on-the-Lake.

**American Bittern.**

*Botaurus lentiginosus* (Montague).— Not at all uncommon in the reed beds along the banks of the Niagara. It has been observed displaying in the breeding season among the extensive reedy shallows near Fort Erie, and it probably nests in that area. The American bittern is usually present from late in April until early October but occasionally individuals may arrive in the area as early as the last of March, and linger on well into November —'The Prothonotary' (1935-38).

**Eastern Least Bittern.**

*Ixobrychus exilis exilis* (Gmelin).— Status not at all well defined. It has, however, been found nesting in some numbers in the marshes of Rattlesnake Island, at Tonawanda, and has been reported a few times as occurring on Grand Island, and at other points on the N. Y. side of the River. (Prothonotary, 1935-38).

**Eastern Glossy Ibis.**

*Plegadis falcinellus falcinellus* (Linnaeus).— One record for Tonawanda Swamp, N. Y., May 1889, (Posson, Auk, 16, p. 193) and seen on one or two occasions in the late spring and early summer of 1939, in marshes near the River (Prothonotary, 1939).

**White-faced Glossy Ibis.**

*Plegadis guarauna* (Linnaeus).— According to Eaton (1910), the only claim of this ibis to a place in the Ornithology of New York State is based on a single specimen, taken on Grand Island in the Niagara River in August, 1844.

**Whistling Swan.**

*Cygnus columbianus* (Ord).— So much has been written about swans at Niagara that it is perhaps quite pertinent to say that no account of the Whistling Swan in Eastern North America would be complete without mention of the Niagara River, and no history of the River would be complete without some reference to swans at the Falls. There would appear to be little doubt that the Niagara has held an important place on the migration route of swans for a great number of years for nearly two hundred years ago the destruction of swans at Niagara Falls was mentioned by the anonymous author of John Bartram's travels and observations and Peter Kalm's added account of the Cataracts at Niagara (1751). Somewhat surprisingly Langille (1884) does not mention swans going over the Falls, but contents himself with the statement that it "is occasionally seen in flocks passing over our Great Lakes, or along the Niagara River, in their times of migration". Since that date there are many references in literature to swans at Niagara Falls, and among those of particular interest are accounts by Lewis (1886); Davison (1889); Savage (1908); Fleming (1908 and 1912), and Reineke (1912 and 1914). The whistling swan is most apt to appear on the Niagara River in the spring between March 10 and 25, at which time it may occur in flocks of several hundred, and while comparatively rare in the autumn, it may be looked for again at that season, toward the end of October, or in early November. According to the records of the Buffalo Ornithological Society, small parties of these swans have on rare occasions visited the river as early as the middle of January, and odd birds have been known to linger in the spring as late as the middle of April; while on the return migration, they have at least one record of a small flock on the River as late as December 24. Although probably more or less regular in following the line of the River during the spring migration, in some years the swan would appear to use the waters of the Niagara as a resting place only to a very limited extent, and the occurrence of the very large flocks near the Falls may take place only at somewhat wide intervals. Several of these big swan years have already been mentioned (Sheppard, et al 1936), but in going over my notes, I find that 1938 should also be given the status of a special year for although there were only a few casualties, and three or four subsequent rescues by Wm. Hill, to record from below the Falls, there was a flock of fifty swans on the River between Navy Island and the Canadian Shore early in the afternoon of March 22, and a little later in that same day, approximately two hundred and twenty-five of these splendid birds were seen resting among the ice flows on the River, close in shore between Chippawa and the edge of the Upper rapids.

**Common Canada Goose.**

*Branta canadensis canadensis* (Linnaeus).— A regular migrant, the Canada goose shares with the Swan some considerable degree of historical prominence as an occasional victim of the Falls. We find geese at Niagara Falls mentioned in Peter Kalm's curious account of the cataracts (1751); in Robt. C. Gourlay's "Statistical Account of Upper Canada" (1822), and in a number of "Forest and Stream and Rod and Gun" articles published between the years 1876 and 1893. March and October are the two months when the Canada goose is most likely to be met with on the Niagara River, but in some years the spring movement may be retarded until the first part of April, and at times the autumn return migration may be extended until after the middle of November; while at rare intervals it has been reported on the River during the three mid-winter months. The most outstanding winter record to come to my notice is that of the Buffalo Ornithological Society for December 18, 1938, when a flock, or flocks, with a given total of four hundred and fifty were reported to have been seen flying northwest over Buckhorn Island.

Although followed, or crossed, quite regularly by the migrating flocks the Niagara does not seem to be favoured to any great extent as a resting place, and therefore this bird seldom falls victim to the Cataracts in these days; but that it does occasionally rest on the waters of the River, is evidenced by the following observations:- On April 17, 1936, four Canada geese were closely observed as they fed, by the tipping method, in shallow water, off the reed beds along the river bank just south of the old ship-yard, about five miles below Fort Erie, and on October 27 in that same year a flock of twenty-four were seen near the centre of the River immediately above the Upper Rapids, drifting, with heads upstream, in a fairly compact, elongated, raft. This flock allowed the current to carry them as far as the rough whitecapped water, when all took to the air, and in a long close line, flew up the River for about three-quarters of a mile before again alighting and once more commencing the drift toward the Falls. Similar manoeuvres were carried out near the Upper Rapids by eighty-five Canada geese among masses of floating ice on March 18, 1939, and at one time during the observation as many as eighty geese were seen crowded on one long cake of ice.

**Lesser Snow Goose.**

*Chen hyperborea hyperborea* (Pallas).— First recorded in 1934, when Cottam (1935), quoting from a letter received from Mr. James Savage of Buffalo, stated in part:- "On November 1, 1934, Mr. H. P. O'Shea, manager of the Bank of Montreal at Fort Erie, shot a snow goose on the Niagara River (Canadian side) about 3 miles north of Fort Erie". During the period October 26 to 31, 1935, it is estimated that some hundreds of snow geese visited the River in company with the immense flocks of blue geese which occurred in the vicinity of the Falls at that time. This interesting visitation has been dealt with at some length (Sheppard, 1936), and mentioned in a more general paper on the blue and lesser snow goose, by Snyder and Shortt (1936). Out of twenty-seven geese rescued alive from below the Falls in 1935, and subsequently examined by the author, only one was a lesser snow goose, all the others were blues. On October 18, 1936, blue, and snow geese again visited the Niagara, but no personal observations were made at that time, and I have been unable to obtain any reliable information regarding the percentage of snow geese present in the flock, estimated to contain in the aggregate about one thousand birds.

**Blue Goose.**

*Chen caerulescens* (Linnaeus).— Although a few blue geese have been reported as occurring from time to time in the general area, Cottam [Savage] (1935), there would appear to be no definite record from the Niagara River until the remarkable visitation of immense flocks during the period October 26 to 31, 1935, (Snyder and Shortt 1936), and (Sheppard 1936). These large flocks which alighted in the River just above the Upper Rapids were estimated to contain in the aggregate between five and ten thousand birds, of which at least two hundred met their death by being carried over the Falls; while about twenty-seven others were rescued alive from below the Cataracts and cared for by Police, Gamewardens, and others. Blue geese visited the Niagara again in 1936, when according to Mr. A. R. Muma, local gamewarden, about one thousand made their appearance on October 18. On this occasion casualties were few for only about thirty went over the Falls, and of these at least twelve were rescued alive from the Lower River.

**Common Mallard.**

*Anas platyrhynchos platyrhynchos* Linnaeus.— Not very common on the Niagara, but individuals, pairs, and very small parties are occasionally seen during autumn, winter, and early spring. The shallows around Goat Island, just above the Falls, are much favoured by this species, and that is the most likely place to find it in winter. Later on toward the early spring, occasional pairs may be met with feeding among reedy shallows close to shore along the Canadian side of the River.

**Red-legged Black Duck.**

*Anas rubripes rubripes* Brewster.— This large, yellow-billed, bright red-legged form of the black duck is common from late autumn to early spring. Generally speaking, this large duck is not in evidence on the River until much later in the season than the smaller olive-billed brownish-legged form which may appear in flocks even as early as the latter part of August.

**Common Black Duck.**

*Anas rubripes tristis* Brewster.— An abundant species on the Niagara, and most decidedly the commonest of the surface feeding ducks. The black duck although occurring in all parts of the River, appears to reach its greatest abundance in the vicinity of the Cataracts where it may be found from August to April. It is very partial to the shallows around Goat Island, and is apt to be found there in very large numbers. This duck is also common on the Canadian side at Dufferin Islands, and on the main stream between Navy Island and the edge of the upper rapids where it may often be seen resting, or disporting itself in the swift waters by allowing the currents to carry it almost to the rapids' edge before rising into the air, flying upstream a mile or more, and repeating the performance in a seemingly endless round. The black duck can be found somewhere on the River during every month of the year, and there is every reason to believe that it breeds on Grand Island.

**Gadwall.**

*Chaulelasmus streperus* (Linnaeus).— Langille (1884) writes, "The Gadwall is about the rarest river Duck on the Niagara." Now, although still far from a common bird, this species cannot be considered an extreme rarity. Mitchell (1934) writes:- "During the past three winters, 1931-32, 1932-33, 1933-34, two or three individuals have, from time to time, been observed in company with the several hundred black ducks and mallards that spend the winter near Goat Island on the Niagara River." Subsequently a few have been recorded every winter in 'The Prothonotary', 1935-9, as occurring off Goat Island, Grand Island, and other points on the River, and, it would appear that the gadwall may be present on the Niagara River, in very small numbers, from October to April. A single bird was observed below the Falls, near the Canadian 'Maid of the Mist' landing, on April 19, 1937, (Sheppard, 1939).

**European Widgeon.**

*Mareca penelope* (Linnaeus).— Rare and accidental; recorded from the Niagara River near Goat Island. (Savage, 1925), and several times, in more recent years, from Grand Island and other points in 'The Prothonotary' (1935-41). Although Savage's Goat Island observation was made on December 25, 1924, subsequent records from the River were in March, April, and October.

**Baldpate.**

*Mareca americana* (Gmelin).— Neither Langille (1884) nor Eaton (1910) make specific mention of the Niagara River in their accounts of this species, but both writers indicate that they consider the baldpate to be a fairly common migrant in the general area. Of late years it has been found to frequent the River in small numbers during both the spring and the autumn migration, but I do not consider it to be one of Niagara's common ducks, and on the Canadian side of the River, its appearances are inclined to be quite infrequent.

**American Pintail.**

*Dafila acuta tzitzihoa* (Vieillot).— Although apparently fairly common during migration in adjacent marsh areas, the pintail is not very frequently seen on the open waters of the Niagara River. It does however occur in the shallows off Grand Island, Navy Island, and Goat Island, and according to the records of the Buffalo Ornithological Society occasionally overwinters on the River, between Buffalo and the Falls. This species occasionally falls victim to the Cataracts for on April 21, 1937 Gamewarden Roy Muma showed me the body of a fine male, one of several others which had gone over the Falls, in a thick fog, about two nights before, in company with a number of scaup, and mergansers.

**Green-winged Teal.**

*Nettion carolinense* (Gmelin).— Occurs sparingly, but apparently not uncommonly during both spring and autumn migration. It has been reported in 'The Prothonotary', (1935-9) as occurring off Grand Island, Goat Island, and other points on the U.S.A. side of the River; while on the Canadian side it has been observed at Dufferin Islands, a semi-artificial backwater a short distance above the Falls. According to Eaton (1910), Ottomar Reinecke reported an instance of this species breeding on Strawberry Island in the Niagara River.

**Blue-winged Teal.**

*Querquedula discors* (Linnaeus).— Of late years this duck has been observed in increasing numbers on the Niagara River near Fort Erie, (Sheppard, 1939). Although long known to breed in adjacent marsh areas in New York State, previous records of actual occurrence on the River would appear to be conspicuous by their scarcity. Since the beginning of 1937 however, it has been found occurring in small numbers during the late spring, and in larger parties, sometimes comprising flocks of from one to two hundred individuals, during August and September.

**Shoveller.**

*Spatula clypeata* (Linnaeus).— An extremely rare duck on the Niagara. It has however, according to records in 'The Prothonotary' (1935-39), been observed on several occasions off Grand Island, and other points on the River.

**Wood Duck.**

*Aix sponsa* (Linnaeus).— Rarely reported from the Niagara River. The Buffalo Ornithological Society, ('The Prothonotary',1935-39), record one or two instances of its occurrence at Grand Island, N.Y., and Dufferin Islands, Ontario.

**Redhead.**

*Nyroca americana* (Eyton).— Langille (1884) writes of hundreds of redheads near Buckhorn Island in the early spring, but in these days, although still occurring during the spring and autumn migration throughout the River, it is rare to see more than two or three together, and then they are usually found associating with flocks, or scattered parties, of scaup, old-squaws or canvasbacks.

**Ring-necked Duck.**

*Nyroca collaris* (Donovan).— Actual records of occurrence on the Niagara River are somewhat scarce; but within recent years, a few ring-necked ducks have been recorded from the river, chiefly around Grand Island, from October to April, in 'The Prothonotary', (1937-42). Eaton (1910) mentions a February, 1899, record near Niagara Falls by Edward Reinecke.

**Canvas-back.**

*Nyroca valisineria* (Wilson).—This duck is sporadic, but not by any means rare on the Niagara during the late autumn, winter and early spring months. Within that period it may occasionally be found on almost any part of the River. It is most apt to be encountered in small parties containing not more than ten or a dozen individuals, although, at times it may be seen in very much larger groups aggregating as many as several hundred birds. A flock of one hundred and thirty observed a few miles below Fort Erie on January 28, 1943, was found to contain approximately eighty per cent adult males. Mitchell in 'The Prothonotary' (1940) records a flock of one thousand seen near Grand Island on February 25.

**Greater Scaup Duck.**

*Nyroca marila* (Linnaeus).— Of late years the scaup or blue-bill, has become one of the commoner species wintering on the Niagara, but unlike some of the other common winter ducks which range the whole river, the scaup appears to show a marked preference for certain areas of the upper reaches, between the southern half of Grand Island and Fort Erie. Within this chosen area, they may be found in loose scattered parties containing a dozen or so individuals, or possibly more often in compact rafts comprising fifty to a hundred or more birds. On one or two occasions, solitary adult males have been seen on the river in early June. Many years ago the scaup was apparently very common on the river as a migrant for Langille (1884) says-"They appear on the Niagara River in great flocks in the migrations, especially in April."

**Lesser Scaup Duck.**

*Nyroca affinis* (Eyton).— Owing to the difficulty of separating the two species of scaup in the field, the status either past or present, of this smaller bird, on the Niagara River, is not at all clearly defined. However, there would appear to be no doubt at all that it occurs during migration for it is then not infrequently seen in close company with its larger relation, at which times the difference in size is clearly discernible. At one time, (Sheppard, et al, 1936), it appeared that the lesser was the commoner of the two scaup frequenting the River in late autumn, but during recent years, at least, that condition would seem to have been reversed.

**American Golden-eye.**

*Glaucionetta clangula americana* (Bonaparte).— From November to April this is the most abundant duck on the River. During that period it is to be met with throughout the Niagara, but is undoubtedly more plentiful in the upper reaches between the Horseshoe Falls and Fort Erie. The golden-eye is common in the immediate vicinity of both Cataracts, and is frequently to be seen swimming and diving in the eddies of the rapids, and even, at times, actually within the rushing, curving waters at the very brink of the American Falls.

**Buffle-head.**

*Charitonetta albeola* (Linnaeus).— Fifteen or twenty years ago this little duck was reasonably plentiful on the Niagara during the migration periods; but of late years it has become comparatively scarce, and can now only be classed as a somewhat uncommon winter visitor with very restricted feeding areas in the upper River. During February and March small parties can on occasion be seen swimming and diving close in shore at certain favoured spots between Chippawa and Fort Erie. At times, the bufflehead will linger on the River until late April or early May, and one of the largest aggregations that I have seen in recent years, comprised a compact group of fourteen which appeared on May 6, 1939 near Chippawa in company with both larger and smaller parties of about six other species of duck.

**Old-squaw.**

*Clangula hyemalis* (Linnaeus).— Still common on the Niagara from December to May, the long-tailed duck was at one time apparently a very abundant species on the River for as long ago as May 10, 1793, Mrs. Simcoe, wife of Governor Simcoe then in residence at Newark (Niagara-on-the-Lake), wrote in her diary:- "There are thousands of duck fly up the river daily. They are called Cawines, a species of wild duck. They have a fishy taste and are never eaten, their down appears to me exactly the same as that of the eider duck." This beautiful duck, the drakes of which to my mind are among the more spectacular of the waterfowl frequenting the river, reaches its peak of abundance on the Niagara during April and May, and at that time it appears to make its way slowly down the river in flocks of varying size, feeding, courting, and disporting itself in the strong currents as it goes, and eventually congregating in very large rafts well out from the Niagara-on-the-Lake, and Youngstown shores, apparently in readiness for the long migration to northern breeding grounds.

**Eastern Harlequin Duck.**

*Histrionicus histrionicus histrionicus* (Linnaeus).— A winter visitor of decidedly rare appearance, but occasionally recorded. Eaton (1910) reports the taking of a young male on the Niagara River in January 1902, (James Savage record), and mentions a specimen said by Dr. Bergtold to have been taken near Buffalo. Mitchell (1934) writes of three female or immature ducks of this species being seen in the Canadian rapids above the Falls on December 23, 1933.

**American Eider.**

*Somateria mollissima dresseri* Sharpe.— Of exceedingly rare occurrence. Langille (1884) writes:- "The young of both the Common and the King Eider are occasionally found here on the Niagara,...........". Eaton (1910) mentions it in his records as being included in the Linden, Bergtold List as a rare winter visitor at Buffalo. Sheppard (1937) reports the shooting of a young male by Mr. W. G. Anderson from a trio of similar plumaged duck found off the south end of Navy Island, in Canadian waters, on November 21, 1936; but this particular bird, which is preserved in the Canadian National Museum, was later shown to be referable to the newly described race *S. m. sedentaria* Snyder.

**King Eider.**

*Somateria spectabilis* (Linnaeus).— Although in general a rare and sporadic winter visitor, this is the eider most likely to be encountered. Eaton (1910) mentions an old record by Allen, (N.O.C. Bul., 5:62), in which it is indicated that eighteen were shot near Buffalo on November 26, 1879. The same author gives a Niagara River record by James Savage for December about 1891. According to the records in 'The Prothonotary', 1935-9, James Savage and others reported three king eiders on the Niagara in March 1936, and several in Buffalo harbour throughout the winter of 1936-37.

**White-winged Scoter.**

*Melanitta deglandi* (Bonaparte).— This is the commonest of the three scoters to visit the Niagara River in autumn and winter, and apparently the only one likely to be met with in the late spring. On May 6, 1939, a small flock, comprising eleven individuals, more than half of them adult males in full breeding plumage, appeared in a sheltered bay near Chippawa. In the late autumn it is frequently seen near Fort Erie, and is then not uncommon in the broad expanse of water immediately below the Falls.

**Surf Scoter.**

*Melanitta perspicillata* (Linnaeus).— An autumn visitor of somewhat sporadic occurrence, the surf duck is apparently the rarest of the three scoters that visit the Niagara. Practically all the individuals of this species seen are in the female or immature plumage, but at least once (Sheppard, 1936), a male in all the beauty of its adult feathering was observed near the foot of the Cataracts. Langille (1884) indicates that the surf duck was not uncommon on the Niagara in those days, occurring with the fall flight, and occasionally in spring.

**American Scoter.**

*Oidemia americana* Swainson.— According to Eaton (1910) the American scoter is a common fall migrant on Lakes Erie and Ontario, and referring to reports received from James Savage indicates that large numbers, up to 150 or more in a day, were shot near Buffalo at the beginning of the century. On the Niagara, this species may be looked for from about the beginning of October until the middle of November. It does not, in these days, appear to be very common or very regular in its appearances on the River, but in some years it may occur in small parties quite frequently during the period just mentioned. Both Langille (1884) and Eaton (1910) indicate that adult males of this species are scarcely ever seen or taken in the area, and although later observations would in general tend to support their contentions in this regard, my notes for December 4, 1943 record a fine adult male, on the River below the Falls, with the bright yellow base of the bill strikingly conspicuous against the jet black plumage.

**Ruddy Duck.**

*Erismatura jamaicensis rubida* (Wilson).— Although Langille (1884) writes: -"Common, and sometimes abundant, on the Niagara

River during the migrations", observations in more recent years indicate that the ruddy duck occurs only sparingly, if fairly regularly, in October; but is now inclined to be decidedly rare during the spring passage. On March 23, 1938 a freshly killed female was procured from among several other avian victims picked up below the Falls, and forwarded to the Royal Ontario Museum for preservation.

**Hooded Merganser.**
*Lophodytes cucullatus* (Linnaeus).— Although decidedly the least common of the three species of mergansers frequenting the Niagara, the hooded merganser is not by any means a rare bird on the River. Sometimes in the spring migration, during a few days toward the end of March, a dozen or more may be seen in travelling along a few miles of river bank; while again during the return migration in November, it is not uncommon to see individuals, or small scattered parties, in the quieter parts of the River either above or below the Falls. Although it is most likely to appear on the River during the months of March and November, my note book contains records of its occurrence as late in the spring as May 7, and as early in the autumn as August 23.

**American Merganser.**
*Mergus merganser americanus* Cassin.— Exceedingly common throughout the winter months, this merganser is part and parcel of almost any scene along the Niagara from November to April. In the early part of the winter, the reddish headed young males and females outnumber the adult males by fifty to one, but toward the end of the winter, full plumaged males are much in evidence, and at this time there is a marked tendency for the males to congregate in certain favoured parts of the River in compact flocks, comprising up to one hundred or more individuals, while the females remain in loose flocks, or small straggling parties, scattered over the great waterway. According to Eaton (1910), the American merganser has been known to nest near Buffalo; but there would appear to be no evidence of any more recent breeding in this general area.

**Red-breasted Merganser.**
*Mergus serrator* Linnaeus.— Occurring somewhat sparingly on the Niagara from November to March; becomes abundant on the River during the spring migration in April and May. Langille (1884) writes: "This is one of the most abundant species on the Niagara during April and the early part of May," and Langille's statement is just as applicable now as at the time he penned it, sixty years ago for on some days toward the latter part of April certain reaches of the River seem to be full of the closely packed rafts of this bird, the rafts varying in size from twenty-five to one hundred or more individuals. When the flocks from the south first arrive in mid-April the sexes are largely segregated, but during their sojourn on the River much courting takes place and it seems probable that by the time of their departure in May many of the birds have paired.

**King Rail.**
*Rallus elegans elegans* Audubon.— Modern records of this rail on the Niagara seem to be decidedly scarce, but many years ago Langille (1884) indicated that it was found along the River; while Eaton (1910) mentions several specimens and nesting records for the general area, including some from South Buffalo, but fails to record any specific instance of occurrence on the Niagara. In 'The Prothonotary', (1939) are records of an observation on May 1, presumably made on the River bank between Buffalo and Tonawanda.

**Virginia Rail.**
*Rallus limicola limicola* Vieillot.— Although apparently a fairly common summer bird in the general area, and breeding in adjacent marshes, actual records of the virginia rail on the Niagara appear to be few and far between. It has however been reported from Grand Island in early autumn, and from a point on the River bank between Buffalo and Tonawanda in spring, in 'The Prothonotary', (1935-9).

**Sora.**
*Porzana carolina* (Linnaeus).— Both Langille (1884) and Eaton (1910) indicate that the sora is a common, or abundant, summer resident in adjacent marshes, but neither are very specific regarding its status as a Niagara River bird. The former does however incidentally make mention of a Carolina rail being killed by a marsh hawk in the marshes of Buckhorn Island. In later times, 'The Prothonotary', (1935-9) has several times recorded it as occurring on Grand Island, and

at nearby points along the River bank, chiefly in autumn.

**Yellow Rail.**
*Coturnicops noveboracensis* (Gmelin).— Eaton (1910), mentions nine records of specimens from near Buffalo, and then goes on to say:- "Between September 20th and October 11th, 1907 Mr. Hermann Grieb of Buffalo, N.Y., saw 12 or 15 of these birds at Rattlesnake Island, Niagara River. During the three weeks while the birds were in the marsh, he saw them at every visit and collected five or six specimens."

**Florida Gallinule.**
*Gallinula chloropus cachinnans* Bangs.— Although a fairly common summer resident in adjacent marsh areas on both sides of the Niagara, occurrences of this bird on the River itself seem to be very infrequent. However, my notes for September 22, 1943 record a Florida gallinule resting on the open River a short distance from the shore, a mile or two above the Black Creek confluence; while in 'The Prothonotary', (1935-40) are records of its occurring on Burnt Ship Creek, and other parts of Grand Island where it has also been reported as nesting.

**American Coot.**
*Fulica americana americana* Gmelin.— The waters of the Niagara do not appear to be very much favoured by this bird which apparently migrates through the general area in April, and again during September and October in quite considerable numbers. The coot however has been recorded as visiting the River upon occasion both above and below the Falls, (Sheppard, 1936) and ('The Prothonotary', 1935-9), but generally as stray individuals, or in small groups for I can find no record of any large flocks occurring on the Niagara.

**Semipalmated Plover.**
*Charadrius semipalmatus* Bonaparte.— Considered an abundant migrant on the River by Langille (1884), it can perhaps scarcely be given that status to-day. Nevertheless it does still occur regularly and fairly commonly in autumn along the Niagara near Fort Erie, and upon the more sandy beaches at the opposite end of the River, near Niagara-on-the-Lake. Mr. J. H. Fleming's list of the Walter Brett collection contains a late spring record of two females taken at Niagara Falls on June 3, 1889.

**Killdeer.**
*Oxyechus vociferus vociferus* (Linnaeus).— A familiar summer resident on adjacent farm lands, the killdeer plover is a common and frequent visitor to the River banks, sometimes becoming almost abundant during September and October, especially along the more southern reaches of Niagara's shore-line.

**American Golden Plover.**
*Pluvialis dominica dominica* (Müller).— Eaton (1910) indicates that the golden plover was common until shortly before that time along the shores of Lakes Ontario and Erie, "especially near the mouth of the Niagara River on the plains some distance back from the Lake, where it occurred in flocks of hundreds the latter part of August and early September and was killed in large numbers." In these days it would appear to be a rare visitor to the Niagara, but my notes contain a record of one with a small party of black-bellied plovers on the River bank at Fort Erie on November 1, 1937, and a few have been reported from year to year by J. Savage and others, ('The Prothonotary', 1935-9), as occurring at Niagara Falls and Fort Erie during the autumn migration.

**Black-bellied Plover.**
*Squatarola squatarola* (Linnaeus).— A common autumn visitor to the River banks at both ends of the Niagara. It occurs from the beginning of September until well on in November, and usually appears in small parties of half a dozen or more individuals. Occasionally somewhat larger groups are met with, and at other times lone individuals, more or less in company with flocks of sandpipers or other wading birds, may be encountered. Although the majority of the black-bellied plover which visit the Niagara River are in the greyish plumage of winter or immaturity, some fine adult birds in partial, or almost full summer plumage are not infrequently met with.

**Ruddy Turnstone.**
*Arenaria interpres morinella* (Linnaeus).— Not uncommon along the River bank near old Fort Erie, and in that vicinity may be met with singly, or in small parties, during the spring passage in May, or when returning south from late July until the middle of September.

**American Woodcock.**
*Philohela minor* (Gmelin).— Writing of August bird observations Langille (1884) mentions meeting with woodcock in the marshy area about Burnt Ship creek which separates Buckhorn from Grand Island. Although now much diminished in numbers, the woodcock still occurs in the same general part of the River area for there are several recent reports of occurrence, and at least one breeding record from Grand Island ('The Prothonotary' 1935-9).

**Wilson's Snipe.**
*Capella delicata* (Ord).— Breeding sparingly in adjacent areas, and not uncommon as a bird of passage through nearby territory, records for the banks of the River, or on the islands, are singularly hard to find. That it does however occasionally visit the Niagara is evidenced by a few observations in 'The Prothonotary' (1935-9).

**Hudsonian Curlew.**
*Phaeopus hudsonicus* (Latham).— A sporadic bird of passage along adjacent lake shores, occasionally visiting the Niagara, usually within the last few days of May and the first days of June. It appears to be extremely rare on the return migration in autumn, but has been recorded from Fort Erie in September, ('The Prothonotary', 1935-9).

**Upland Plover.**
*Bartramia longicauda* (Bechstein).— Not altogether uncommon as a breeding bird in nearby dry fields and rough pastures, and has been observed very close to the River bank, especially in the vicinity of Fort Erie, and in this way is perhaps entitled to a place among the water-birds of the Niagara.

**Spotted Sandpiper.**
*Actitis macularia* (Linnaeus).— Exceedingly common along the entire Niagara from the latter part of April until toward the end of September, and is one of the most familiar summer birds on the River. Langille (1884) states that the call of this species is the most constant bird-note along the River, and this statement, made sixty years ago, is just as applicable to-day.

**Eastern Solitary Sandpiper.**
*Tringa solitaria solitaria* Wilson. A somewhat uncommon migrant through the general area. My notes carry a record of one seen on September 18, 1937, in the moat at old Fort Erie within a very short distance of the River bank, and in 'The Prothonotary' (1936) there is report of a very late solitary sandpiper seen during a trip around Niagara on October 11th.

**Western Willet.**
*Catoptrophorus semipalmatus inornatus* (Brewster).— Mentioned by Langille (1884) as being found occasionally on the Niagara in the migrations, but not recorded from that time until recent years when one, presumably the western form, was closely observed on August 21, 1936, near the water's edge just south of Fort Erie, Ontario, (Sheppard, 1936). Since that date, there have been one or two reports in 'The Prothonotary' (1936-9) of occurrences within that same section of the River bank.

**Greater Yellow-legs.**
*Totanus melanoleucus* (Gmelin).— A somewhat uncommon visitor to the Niagara, but apt to occur singly, or in very small groups, at almost any point along the River banks from July to October. According to records in 'The Prothonotary' (1935-9), the greater yellow-legs occurs fairly commonly in adjacent territory during April and May, and has been reported in April at Burnt Ship Creek, Grand Island; but in general, spring records for the River appear to be quite scarce.

**Lesser Yellow-legs.**
*Totanus flavipes* (Gmelin).— Perhaps even rarer in spring than its larger relative, the lesser yellow-legs is decidedly more abundant during the autumn migrations, and is then a familiar sight along the Niagara, from the end of July until about the middle of October. During that period it may be found in small parties here and there at almost any point along the banks, but perhaps reaches its greatest numbers in the area embracing most of the upper River between Goat Island and Buffalo on the one side, and Navy Island and Fort Erie on the other.

**American Knot.**
*Calidris canutus rufus* (Wilson).— A somewhat uncommon spring and autumn migrant along adjacent lake shores, the knot occasionally occurs on the Niagara during its southward passage, from August to October. It is then most apt to be found in small groups, or as single individuals, associating

more or less with other waders. Within recent years it has been recorded from the River bank near Fort Erie, and from the vicinity of the Falls, (Sheppard et al, 1936), and 'The Prothonotary' (1935-9). According to Eaton (1910), inland records for the knot were, at that time, comparatively scarce, but he mentions among others a few specimens taken by Messrs. Reinecke and Savage near Buffalo.

**Purple Sandpiper.**

*Arquatella maritima* (Brünnich).— On January 16, 1939, Mr. James Savage of Buffalo very kindly notified me of the presence of a purple sandpiper near Niagara Falls, and in his letter stated that it was first seen on December 18, 1938, in a cascade up stream from the outer Sister Island (Goat Island area). Mr. Savage's letter is too long to give in full, but the final paragraph is of such particular interest that I take the liberty of quoting it :-"This is the only Purple Sandpiper I know of occurring in this area in all the years I have been observing. We have left it undisturbed rather than collect it as a specimen, but I am still hoping to get some good pictures." Mr. Savage's report would appear to constitute the first record for the River. More recently in 'The Prothonotary' (1941-42), several other examples of this sandpiper have been recorded at Niagara Falls.

**Pectoral Sandpiper.**

*Pisobia melanotos* (Vieillot).— A fairly common autumn visitor to certain favoured sections of the River, notably the rocky weed-grown flats near old Fort Erie, and to a lesser extent the more sandy beaches near Niagara-on-the-Lake. Spring records for the general area appear to be scarce, but single individuals, or small flocks comprising up to six or eight birds, may be looked for along the River banks on their return migration, from mid-July until about the end of October. Langille (1884) mentions pectoral sandpipers, near old Fort Erie, at the end of August.

**White-rumped Sandpiper.**

*Pisobia fuscicollis* (Vieillot).— One of the rarer migrant waders to visit adjacent lake shores; occasionally occurs on the Niagara. It has been recorded from Fort Erie in August, (Sheppard et al, 1936), and from Fort Erie, and Niagara Falls in September and October, ('The Prothonotary', 1935-9).

**Baird's Sandpiper.**

*Pisobia bairdi* (Coues).— A rare autumn transient recorded from the River bank near Fort Erie, (Sheppard et al, 1936).

**Least Sandpiper.**

*Pisobia minutilla* (Vieillot).— Comparatively rare in the spring migrations; common along adjacent lake shores from July to September, and during that period in autumn a frequent visitor to the Niagara. It is then apt to appear almost anywhere along the River banks, but especially favours the wider open beaches, and here it may be met with in small parties, or medium sized flocks, which are frequently associated with semipalmated, or other sandpipers.

**Red-backed Sandpiper.**

*Pelidna alpina sakhalina* (Vieillot).— A fairly common autumn visitor to the more open River banks or beaches, and one of the most frequently met with of the migrant sandpipers in Spring, when during the latter part of May small flocks in breeding plumage may be encountered. On October 25, 1936, several small flocks of red-backed sandpipers, probably not less than thirty or forty altogether, were observed feeding in the shallow waters and rocky pools along the south and east shores of Goat Island. The birds were all in the grey plumage of winter, but a few showed faint traces of dark feathers on the back. They were very tame and allowed a close approach and prolonged observation. One bird fed to within six paces of my position. In crossing and re-crossing the many small pools, it was noticed that the small waders on several occasions got out of their depth and resorted to swimming; a habit the writer has never before observed in this species.

**Eastern Dowitcher.**

*Limnodromus griseus griseus* (Gmelin).— An autumn transient of somewhat uncommon occurrence, dowitchers, probably referable to this form, are occasionally to be seen from July to September on the wide, flat, River banks near Fort Erie, (Sheppard et al, 1936). It has also been reported from Grand Island and other points on the River in 'The Prothonotary' (1935-9). From the available records it would seem that they usually occur singly, or in quite small groups, in company with one or two other species of wading birds; but very occasionally larger parties, or small flocks, may appear on the Niagara. Langille (1884) mentions a flock of nine at Fort Erie in late August.

**Long-billed Dowitcher.**

*Limnodromus griseus scolopaceus* (Say).— Writing of this more westerly distributed form of the dowitcher, Eaton (1910) mentions a record by Mr. Savage of a specimen from Strawberry Island, Niagara River, October, 1892. In recent years, there is a report by Savage and Mitchell ('The Prothonotary', 1942) of a long-billed dowitcher at Niagara Falls, on August 30, 1942.

**Stilt Sandpiper.**

*Micropalama himantopus* (Bonaparte).— A somewhat rare autumn transient along adjacent lake shores from July to September, the stilt sandpiper occasionally appears on the Niagara and has been recorded from Fort Erie, (Sheppard et al, 1936), and from the vicinity of the Falls, and other parts of the River ('The Prothonotary', 1935-9). According to Eaton (1910), two were taken near Buffalo on September 16, 1893, by J. Savage.

**Semipalmated Sandpiper.**

*Ereunetes pusillus* (Linnaeus).— Langille (1884) says of the semipalmated sandpiper:- "I have seen it in large flocks in the month of August, on the Niagara River, alighting on the large rafts of logs on their way to the mills of Tonawanda." In these days, this species does not perhaps occur in such large flocks, but it is still a very common visitor, from July through September, to Niagara's more open beaches, and mud flats.

**Western Sandpiper.**

*Ereunetes maurii* Cabanis.— This species has been reported from the River at Niagara Falls, and Fort Erie, on several occasions during the autumn migration, by J. Savage and others ('The Prothonotary', 1935-9). Eaton (1910) states that Mr. Savage took it near Buffalo on the Canadian side in September 1897.

**Marbled Godwit.**

*Limosa fedoa* (Linnaeus).— Langille (1884) says:- "This species is occasionally found on the Niagara in the migrations." Under James Savage, Notes, Eaton (1910) gives a Niagara River record for October 1891. There does not appear to be any recent record from the River.

**Sanderling.**

*Crocethia alba* (Pallas).— A common autumn visitor to the Niagara, appearing singly or in small flocks, and especially favouring the flats and more open beaches at Fort Erie and Niagara-on-the-Lake. Writing of camping near old Fort Erie in the late summer, Langille (1884) indicated that the sanderling was of very frequent appearance in those days at that particular point.

**Red Phalarope.**

*Phalaropus fulicarius* (Linnaeus).— Eaton (1910) gives a James Savage record for Niagara River, N.Y., under date of October 1892, and another, a female, from Buffalo, September 26, 1894; referring in both instances to Auk, 12; 313. In recent years, this species has been recorded at Niagara Falls, and other points on the River, (The Prothonotary', 1935-41).

**Pomarine Jaeger.**

*Stercorarius pomarinus* (Temminck).— According to Eaton (1910), two specimens have been taken at Buffalo, N.Y., and are, or were at that time, in the collections of R. H. Reed, and the Buffalo Soc. Nat. Science. H. D. Mitchell, ('The Prothonotary', 1939), reports a jaeger, probably referable to this species, at Sheridan near the Niagara River.

**Parasitic Jaeger.**

*Stercorarius parasiticus* (Linnaeus).— Apparently several immature examples of the parasitic jaeger have been taken in the interior of New York State, and among them one on the Niagara River, N. Y., September 1887 (Harry Lansing); and two at Buffalo, N.Y. (J. Savage), one of them on October 2, 1895, and the other about October 25, 1907 (Grieb), (Eaton, 1910). The files of 'The Prothonotary' (1940-41) contain several records of this species on the River. Mitchell collected an immature example in the dark plumage phase at Bird Island opposite Fort Erie, on November 12, 1941.

**Northern Skua.**

*Catharacta skua* Brünnich.— Eaton (1910) says:- "The second [New York] specimen was secured on Niagara River, in the spring of 1886, and is reported in Bergtold's List of the Birds of Buffalo and vicinity, also in the Auk, 6:331." Reinecke (1916) records an adult skua picked up in the Niagara River gorge on December 3, 1915, and brought to him by friends.

**Glaucous Gull.**

*Larus hyperboreus* Gunnerus.— A somewhat sporadic, but not altogether infrequent winter visitor to the Niagara, this bird may on occasion be seen singly, or in small groups of two or three, which are usually found associating to some extent with larger aggregations of one or more other species of gull. The winter of 1937 was an outstanding one in connection with this species on the Niagara, and for December of that year my notes contain several records of glaucous gulls seen near Fort Erie, two of which were in the pure white plumage of second winter birds, and one, apparently a first year bird, in a plumage phase of pale creamy-buff with very indistinct mottlings. Eaton (1910), while not specifically mentioning the Niagara River in his account of this species, gives two James Savage records for Buffalo, one January 29, 1895, and the other February 13, 1898. Sheppard et al (1936) report an example in adult plumage observed in the River below the Falls on May 4, 1924.

**Iceland Gull.**

*Larus leucopterus* Vieillot.— With somewhat the same status on the River as the preceding species the Iceland or white-winged gull occasionally favours the Niagara with its presence. Mitchell (1934), indicates that this species was more numerous than usual in the vicinity during the winter of 1933-34; while Sheppard, et al (1936) report an observation of two mottled immature birds seen flying back and forth over the rapids imimmediately above the Horseshoe Falls on January 24, 1934. Birds in adult plumage are apparently quite rare, but my notes for the winter of 1937, which include several records of Iceland gulls on the Niagara, include one observation of an adult bird in perfect plumage, seen in company with several other species of gull, about five miles below Fort Erie.

**Great Black-backed Gull.**

*Larus marinus* Linnaeus.— Although inclined to be sporadic in occurrence, sometimes almost common. Mitchell (1934) says "During the past winter as many as nine individuals of this species have been seen in one day on the Niagara River between Niagara Falls and Buffalo." The winters of 1936-37, 1937-38 and 1940-41 were also outstanding in regard to this bird on the River and my December and January notes for these years contain numerous references to great black-backed gulls, sometimes up to twenty or more seen in a trip between Chippawa and Fort Erie. Unlike the two preceding species, this gull appears more often in adult plumage than in that of the immature, a circumstance which makes it a very conspicuous sight.

**Herring Gull.**

*Larus argentatus smithsonianus* Coues.—The commonest winter gull. It is present in varying numbers from September to May, but probably reaches its peak of abundance during the months of November and December, when it is a common sight to see many hundreds in the air at once, especially in the immediate vicinity of the Falls. This habit of congregating in large numbers over the River near the Cataracts was noted many years ago for Langille (1884), mentions "The hundreds that sail through the mists arising from the Niagara Falls in winter."

**Ring-billed Gull.**

*Larus delawarensis* Ord.— This species appears to have become increasingly common of late years. Eaton (1910) apparently considered it to be a rather rare visitor to the Niagara area. It must now be called a common, if not abundant bird on the River from September to November; becoming rather rare in mid-winter, and quite common again in late winter and early spring.

**Laughing Gull.**

*Larus atricilla* Linnaeus.— According to Eaton (1910) the laughing gull was recorded by Bergtold (1889) as an accidental visitant to Buffalo and vicinity. The next record was some forty-six years later when one was seen at Niagara Falls on October 21, 1935 by several members of the A.O.U. while on their way to the annual meetings held that year in Toronto. Since that date there have been several reports of laughing gulls at Fort Erie, and other points on the River, by Savage, Mitchell and others ('The Prothonotary', 1935-39). Sheppard (1938) records an observation at Fort Erie on September 18, 1937.

**Franklin's Gull.**

*Larus pipixcan* Wagler.— Absent, or overlooked, the Franklin gull was not recorded from the Niagara until about 1939; since which time several have been reported during November, in 'The Prothonotary' (1939-41), including one collected by Mitchell at Bird Island opposite Fort Erie North on November 10, 1941.

**Bonaparte's Gull.**

*Larus philadelphia* (Ord).— Occurring on the River in larger flocks than any other gull it is abundant from August to December, and again in April and May. During these periods it may be seen in loose scattered parties, or in compact flocks, numbering from twenty-five to fifty up into the thousands. At times sections of the River seem literally alive with the graceful fluttering forms of this very beautiful little gull. Although comparatively rare during the late winter months and again during the mid-summer period, my notes contain records of this species on the Niagara for every month of the year, with the possible exception of February. That this species has been an abundant visitor to the river for a great number of years is evidenced by the writings of Langille (1884) who discusses with enthusiasm the beauty of their appearance on the Niagara in spring and fall.

**Little Gull.**

*Larus minutus* Pallas.— Recorded from the Niagara River near Buffalo on several occasions during the past few years in 'The Prothonotary' (1938-42). According to Mr. H. D. Mitchell (letter March 12, 1942) the little gulls observed on the Niagara have been invariably associated with Bonaparte's gulls, chiefly with the late migration movement of that species in November, but at least once in September. A specimen of this old world wanderer was collected by Mitchell at Bird Island opposite Fort Erie on November 10, 1941.

**Ivory Gull.**

*Pagophila alba* (Gunnerus).— At one time it appeared that the only claim of this arctic species to a place on the Niagara list was that in a report by the author, (Sheppard et al, 1936) of a single adult bird in pure white plumage observed, in December, 1924 as it flew back and forth over the wide expanse of water below the Falls; but in a letter dated November 25, 1940, Mr. H. D. Mitchell of Buffalo has kindly drawn my attention to another record of a bird, in the immature spotted plumage observed by W. Vaughan in the rapids above the Horseshoe Falls, opposite Goat Island, on February 10, 1934.

**Atlantic Kittiwake.**

*Rissa tridactyla tridactyla* (Linnaeus).— On January 8, 1939 an adult seen near Buffalo, and another reported November 9, 1939 at Bridgeburg, Ontario (Prothonotary).

**Sabine's Gull.**

*Xema sabini* (Sabine).— Reported once or twice by Mitchell and others ('The Prothonotary', 1938-9), as occurring near Fort Erie.

**Forster's Tern.**

*Sterna forsteri* Nuttall.— Apparently a rare visitor to the River, but it is a species which may have been overlooked due to its close resemblance to the common tern. Sheppard (1937) records three immature, or completely winter-plumaged birds, at the junction of Frenchman's Creek and the Niagara on October 19, 1936, and there are a few reports of single examples seen at Fort Erie and Niagara Falls, chiefly during the month of September, ('The Prothonotary', 1935-42).

**Common Tern.**

*Sterna hirundo hirundo* Linnaeus.— A characteristic summer bird becoming abundant in May, and again in September, and may at times linger well on into the month of October. This species breeds in numbers at fairly nearby points on Lake Erie, and at times acts very much as though there were some small breeding colonies on the River itself. Certainly young birds not at all strong on the wing are frequently seen along Niagara's banks.

**Roseate Tern.**

*Sterna dougalli dougalli* Montagu.— A very rare visitor to the Niagara, Eaton (1910) records one from the Niagara River, May 31, 1886, in the Davison List. 'The Prothonotary', (1935-9), contains at least two observations of this species on the River; one on August 22, 1935 above the Falls (Beardslee), and another at Niagara Falls, N.Y., on June 29, 1937 (Mitchell).

**Caspian Tern.**

*Hydroprogne caspia imperator* (Coues).— Uncommon, but not particularly rare; recorded from the River on a number of occasions. Eaton (1910), lists three specimens taken on Strawberry Island, Niagara River in September 1899 (James Savage), and gives several other J. Savage records from Buffalo. Sheppard et al (1936) mention one observed below the Falls, on May 4, 1924. The files of 'The Prothonotary' (1935-41) contain several records of occurrences at Niagara Falls, Grand Island, and Fort Erie, chiefly during the months of July, August, and September; but there are one or two reports of observations on the River at the latter part of April, or in May.

**Black Tern.**

*Chlidonias nigra surinamensis* (Gmelin).— Occurring on the Niagara as a bird of passage, this small tern sometimes appears in hundreds on the River near Fort Erie for a period of a few weeks during August and September. At this time the birds present many interesting plumage phases, chiefly in the lighter colours of immaturity, and adult transition to winter, with only a small minority showing remnants of the blackish feathering of the breeding season. The black tern is less common during the spring passage, but it is not unusual to see a few in full breeding plumage during the latter part of April, and the first two or three weeks of May.

**Brünnich's Murre.**

*Uria lomvia lomvia* (Linnaeus).— This maritime species has apparently penetrated inland as far as the Niagara River on several occasions during the past fifty years. Eaton (1910) gives records for Buffalo, N.Y., November and December 1894 (Savage), and Niagara Falls, N.Y., December 23, 1896 (Fleming). Writing of a visitation of these birds to Lakes Ontario, and Erie, Fleming (1908) mentions their occurrence on the Niagara River below the Falls, on December 1, 1907.

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## CURRENT LITERATURE

THE BIRDS OF SIMCOE COUNTY, ONTARIO, *By O. E. Devitt, 1943, 44. Trans. Roy. Can. Inst., Vol. 24, pp. 241-314, Vol. 25, pp. 29-116, map + 5 photographs.*

A well-done, annotated list; the area between Georgian Bay and Lake Simcoe is described, and the history of its birds and bird study sketched. It is in the transition Life Zone and the list contains 257 species of birds (236 substantiated by specimens) plus 5 more that are considered hypothetical. Annotations include status, migration dates, specimens taken, and occasional historical and life history data. The birds for the most part are identified to species only. The illustrations consist of a useful map and 5 photographs showing habitats. There is a 3-page bibliography and a species index.— A. L. RAND.

# THE NORTHERN ELEPHANT SEAL (*Mirounga angustirostris*) IN BRITISH COLUMBIA WATERS AND VICINITY[1]

*By* IAN MCTAGGART COWAN *and* G. CLIFFORD CARL
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IN THE WINTER of 1935-36 M. E. Lohbrunner of Victoria reported to us that on April 25, 1934, while trolling for salmon 35 miles southward of the "Gander Islands" [Moore, Byers, Harvey and Conroy Islands, B. C., approx. 52° 60′ north lat. and 129° 40′ west long.] he had seen an adult male elephant seal. The animal permited close inspection with binoculars.

Again on May 14, 1934, 40 to 50 miles southwest of "South Gander Island" the same or another individual was sighted by Lohbrunner, this time at some distance.

On an unstated date in May or June of the same summer several members of the crew of a whaling vessel reported sighting a bull elephant seal in Queen Charlotte Sound.

These accounts left us convinced that this large seal occurred upon occasion in the waters off the British Columbia coast and led us to make further inquiries.

Many fishermen were questioned but none had seen anything resembling the animal. Our convictions were reinforced, however, by the taking of a specimen at Kasaan, Prince of Wales Island, Alaska, in the winter of 1939-40 (Willett 1943).

Dr. V. B. Scheffer, of the United States Fish and Wildlife Service, Seattle, Washington, during the course of marine mammal studies off the Washington coast has obtained several circumstantial accounts of the occurrence of elephant seals in the area both recently and in the distant past. These he has generously made available to us as follows.

An individual was sighted in August 1941, 70 miles west south west of Cape Flattery, Washington, by Chris Svendsen of 3200 East 62nd Street, Seattle, while trolling for tuna. Svendsen has fished off the Pacific northwest coast for 40 years and has frequently seen elephant seals, called by him "mermaids." They are seen in the summer months in calm weather 60 to 70 miles off shore. They go through shark nets with ease and have never been caught by any of the local fishermen. He reports three of four "kinds" [ages and sexes?] all distinct from the sea lions of which Svendsen has seen thousands along the northwest coast and among the Shumagin Islands, Alaska.

In the case of the individual noted in August 1941, Mr. Svendsen brought his 60 ft. boat quietly up to within a few feet of the seal and noted that it was "almost as long as the boat, had a hairy body, and round head with a long nozzle tilted backward." [The size is of course an exaggeration but reflects the impression of great bulk conveyed by this seal.]

Carl Julius, fisherman of Point Roberts, Washington, interviewed by Scheffer on June 16, 1942, stated that elephant seals are occasionally seen. He and Richard Peltier told of seeing an "elephant seal" several times over a 3-4 week period, the last about two months previously. It was seen at Point Roberts light, at the dock and on the beach. It was said to be as large as a sea lion, chocolate colour, "over a ton," raised its rump out of the water when swimming, and was once within 75 feet of them. It had a long snout. Nothing like it had been seen before.

The description of this specimen as "chocolate colour might tend to throw some doubt upon its identity but if the long snout was actually observed and not added afterwards this detail alone could be considered diagnostic.

On October 25, 1944, J. W. Slipp and V. B. Scheffer interviewed, through an interpreter, an old Makah native, Lance Kallapa [spelling?], perhaps 90 years of age.

Kallappa stated that the elephant seal was familiar to him, and to his father and grandfather when they used to hunt fur seals 20 miles or more off the Strait of Juan de Fuca,

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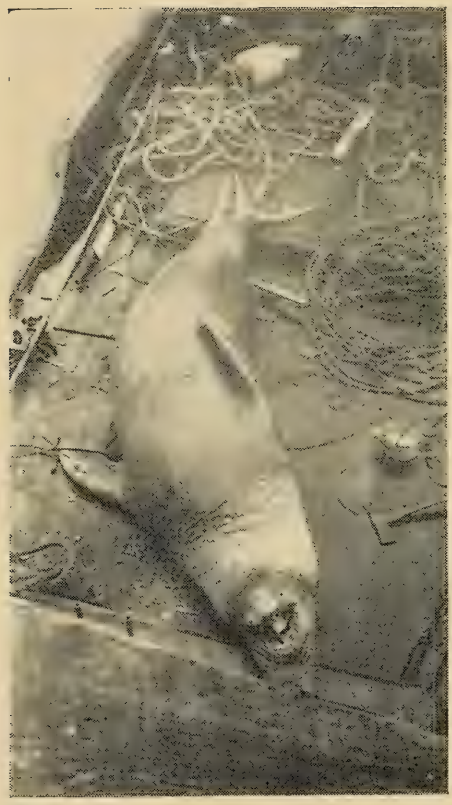
[1] —Received for publication June 29, 1945.



Northern elephant seal (*Mirounga angustirostris*) taken near Pine Island, Queen Charlotte Strait, September 22, 1944.

He had never killed one although he had seen the animal close at hand. It is called *lik kwa si* by the Makah, which means one who draws his neck in, or hunches his shoulders. It is lighter in colour than the Steller's sea lion and larger. It stands more or less upright in the water. The smallest ones are as large as a harbor seal [100-300 lbs.?] and have a single hump or ridge on the snout. The number of ridges increases with age up to about four.

Only one elephant seal at a time was seen, never mother and young. The only time the Makah ventured out this far was in the spring, and so they have no information as to whether the seals are present in other seasons..

The flippers are hairy. The flesh good to eat. The bones are somewhat like halibut [translated as porous by the interpreter], light and with more holes than the sea lion. The natives always butchered elephant seals at sea, never brought them to land entire. Live or stranded ones were never, to his knowledge, seen on the Washington coast itself.

John Markishtum and two other men who were fur sealing [off Cape Flattery?] two or three years ago saw an elephant seal.

The above description contains sufficient detail to make it certain that the Makah had encountered the elephant seal with fair frequence and that formerly at least it was of fairly regular occurrence as far north as Cape Flattery.

One further possible sight record from the British Columbia coast is contained in a letter from Charles Haan, fisherman, of Prince Rupert, B. C. received on December 29, 1944. He tells of seeing a beast answering the description of an elephant seal off the west coast of the Queen Charlotte Islands. "It looked much the same as a sea lion in colour but with a different shaped head and seemed to move much slower in the water. What made us first notice it was that it would stand straight up in the water about 5 feet high and remain that way for quite a little while."

The final and incontrovertible evidence of occurrence in British Columbia waters was obtained when a large male was shot near Pine Island, Queen Charlotte Strait, on September 22, 1944.

According to A. Lyon of Port Hardy, who informed us of the capture, this animal had been reported at and near Pine Island since the first part of May, 1944. Several times in the three years previous Lyon had heard fishermen mention "a large, grey-headed sea lion" in the vicinity of the Scott Islands, off the northern tip of Vancouver Island. These are only some 50 miles from the place of capture of the specimen and it is possible that this or another elephant seal was involved rather than a sea lion.

The specimen was 15 feet long but other measurements were not taken. However, this with the excellent photographs furnished by Lyon make possible its determination as an adult male.

The skull is destined for the Provincial Museum.

In view of the above records and in the absence of any precise knowledge of the whereabouts of the elephant seals of the Guadalupe Island herd outside the pupping season (Davidson, 1929), it seems plausible to suggest that they lead a pelagic existence through waters well to the north of the breeding colony and not infrequently reach British Columbian latitudes.

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# SITES FOR CLUB-MOSS PROTHALLIA IN NOVA SCOTIA[1]

*By* W. G. DORE[2]
*Dalhousie University, Halifax, N. S.*

ON ACCOUNT of their small size and obscure appearance as well as being buried a few inches in the soil, the prothallial stages of our common club-mosses (*Lycopodium*) are seldom encountered even by the most diligent field botanist. As a matter of interest, the first discovery of *Lycopodium* prothallia in America, in Michigan, was less than 30 years ago as recounted by Gauthier and Dumais in their paper in Naturaliste Canadien, vol. 65, pages 280-284, 1938, wherein they report their own finds of colonies of 10 prothallia of *L. obscurum* and 7 of *L. clavatum* in the province of Quebec.

During the course of an excursion to study the revegetation of burnt-over land at Preston Road about 6 miles east of Halifax on November 15, 1944, an abundance of these early stages in *Lycopodium* development were unearthed. The area here of a few square miles in extent bearing the dead and charred remains of what was formerly a young coniferous stand, proved to be an excellent site in which to note the species of plants that colonize following fire and to study the means by which they do so. Small plants of club-moss scattered over the blackened soil were among the conspicuous invaders. Since these were all immature plants, it was obvious that they must have developed from spores subsequent to the fire, and in so doing must have passed through the prothallial or gametophytic stage in their life cycle. With this knowledge in mind, in only a matter of minutes, by digging into the surface soil at the base of the young sporophytes, the little gametophytes were revealed to the keen eyes of the members of the party. In appearance and size, the tuberous gametophytes somewhat resembled a kernel of corn or the meat of a hickory nut, although possibly more like small fragments of cheese in consistency and in their pale orange colour. Generally, one or two naked gametophytes, not yet sending up a green sporophyte, could be found in the same handful of soil. On plants over a couple of years old, the gametophyte was pretty well digested away and only a fibrous shell remained attached to the foot.

A few days later more prothallia were found, again marked by young sporophytes, on an abandoned roadway in the woods covering a point extending out into Cole Harbour. Subsequently, on December 10, Mr. Roger Bidwell discovered at a third site, in Point Pleasant Park within the Halifax city limits, two young plants, no larger than shoots of the common hair-cap moss, with gametophytes attached to their bases. Further search here yielded 18 gametophytes, 13 of which had small sporophytes. All were found in a heavily wooded portion of the Park within an area where the soil had been disturbed by the installation of a shallow drainage system for buildings nearby.

All three habitats were similar in that there was a strongly acid soil with a surface layer of raw humus composed of spruce and pine needles. This, in itself, did not seem of great significance since such conditions prevail over a large part of the whole province. In each case, however, there was evidence that the original conditions of soil or vegetation had been disturbed, in one case by fire and in the others by overturning of the soil for road-building or by ditching. It is thought that this bit of information may be found useful to others in search of club-moss prothallia by directing them to such sites for careful examination. In the fall of the year, too, when other plants have lost their leaves, the small evergreen sporophytes are more easily detected.

Further information about the burnt-over area at Preston Road was obtained by observations made there. The fact that the trunks of the dead trees were merely charred on one side and the deep organic soil was almost unaltered, indicated that the fire had been a rapid one driven by a strong north-westerly wind and at a time when the soil must have been saturated with water. Some twigs on dead balsam firs had been killed when their terminal buds were just starting to expand.

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[1] —Received for publication December 26, 1944.

[2] —Present address:
Ontario Agricultural College, Guelph, Ont.,

Suckers arising from the base of old red maples showed six layers of wood growth on sectioning. From these additional observations, the time of fire was dated to the spring of 1939. Since here we have a fairly well defined starting point in history, opportunity is offered to investigate such matters as the relationship of spore germination to symbiotic fungi, the longevity of the gametophytic generation and the rate of sporophyte development. There is also the possibility that the *Lycopodium* spores or even the gametophytes themselves ante-dated the fire; else by what means would they develop at a depth of one to three inches in the soil? Although 5 species of *Lycopodium* are common in the Halifax district, only 2 species seem to be represented in the collection of young sporophytes, *L. obscurum* and *L. clavatum*, and it is only in the case of the former that gametophytes have been definitely found attached. The identification of juvenile forms is a difficult matter and the distinctive characteristics of gametophytes lacking attached sporophytes has apparently not been worked out.

## NOTES AND OBSERVATIONS

ADDITIONS TO THE BIRD LIST OF MANITOBA.— This year, the ornithological collection of the Manitoba Museum has been enriched by the addition of two species which do not appear to have been recorded previously in Manitoba and a third species has been secured which appears to be the second specimen reported in the Province.

**Little Auk.**

*Alle alle.*— On 7th November, 1944, Constable James McDonald, of Norway House, noted a strange bird on the water at Warren's Landing which seemed unable to fly; eventually he secured it with a rifle and forwarded it to G. W. Malahar, Acting Supervisor, Provincial Natural Resources, who forwarded it to the writer for identification on March 15th, 1945. The bird was completely desiccated and the interior had been largely eaten out by insects but the plumage was in far better condition than might be expected. It has been retained as it was on arrival. The specimen is numbered 1219. This species does not seem to have been recorded, even as a sight record, at Churchill.

**Violet-green Swallow.**

*Tachycineta thalassina.*— On April 30th, 1945, J. H. Inkster, Forest Service, Marchand, Manitoba, picked up a dead specimen in the Forestry Nursery grounds at Sandilands and mailed it to the Bird Editor, Winnipeg Tribune, where it remained in a warm room until the Editor called for the parcel on May 10th, when he brought it to the writer at once. The specimen is in nuptial male plumage and was slipping so badly that it was impossible to skin it. The writer, therefore, injected it at once with formalin by means of a hypodermic syringe and thus arrested any further decay. With careful handling, the specimen should be reasonably safe now.

For several days before the bird was found, we had a succession of northwest gales with snow and rain and it is reasonable to suppose that it had been taken downwind for hundreds of miles in a weakened condition. The specimen is numbered 1222 in the Museum catalogue.

**American Barn Owl.**

*Tyto alba.*— On April 8th, 1945, S. J. Moffat, of La Riviere, Manitoba, found a male hiding in a spruce tree on his property and being mobbed by a lot of small birds. He collected it and forwarded it to J. P. Hawkins, Taxidermist, Winnipeg, to be mounted. J. P. Hawkins advised the writer who managed to get the owner to donate the specimen to the Manitoba Museum; this specimen completes the Museum's collection of all owls known to have occurred in the Province. The specimen is numbered 1221 in the Museum catalogue.

Taverner (1934) states that there are single records for Ontario, Manitoba and British Columbia; the writer is unaware of any records, even sight records, for Manitoba since that date.— L. T. S. NORRIS-ELYE, Winnipeg, Manitoba.

# NOTES AND OBSERVATIONS

SYMBIOTIC TENDENCIES AMONG BIRDS. — I have seen two instances of the above, which are worth recording. Any form of inter-dependence amongst birds of different species does not seem to be widespread.

My first note relates to July, 1934 when I was camping near the mouth of the Sooke River, at Land's End, on Vancouver Island. I was watching some California murres feeding and I soon discovered that about six ring-billed gulls were reaping a harvest as a result of the under-water activities of the murres. It appeared that while the murres were chasing their prey below surface, they were scaring shoals of small fish fry to the surface and the gulls were getting a great many on the surface.

The gulls were looking excitedly about them to discover the whereabouts of a murre below surface and would race toward the spot, generally flying, and would then capture a large number of small fish or other animals. They frequently lost the whereabouts of these murres and it was amusing to see the anxiety of the gulls to locate them. It seemed sometimes as if the fish themselves were seen on the surface, when the gulls would hurry to the spot. At times, the excitement of the gulls was such that they were turning their heads quickly from side to side and would twist and turn their bodies when swimming and reminded me a little of the actions of phalaropes.

My second instance was on June 7th, 1943 at Gimli, Manitoba, on the western shore of Lake Manitoba, near Willow Point wher a long line of vegetation had been washed up some twenty feet above waterline and was rotting in the sun. Here I discovered a flock of some eighty ruddy turnstones, two hundred sanderlings and odd red-backed and white-rumped sandpipers feeding eagerly on insects, probably in the larval stage.

The turnstones were busily flipping dead sticks and rotting vegetation. About a dozen of these turnstones were each attended by a sanderling facing the turnstones and these would rush in and steal the insect disclosed by the turnstone; as the turnstone moved on, the sanderling would keep close to it and wait again. While I watched for over half an hour with field glasses at about thirty yards, I noticed that other sanderlings tried to join in the same game, but the predatory sanderlings invariably ran violently at these newcomers to the game and drove them off, chasing them on foot or on the wing, after which the original sanderling would return to a turnstone. I was surprised to see that the would-be interlopers had not enough sense to accompany another turnstone that had not acquired a satellite; if this is a relatively new development among a few individual sanderlings, the lack of initiative among the other sanderlings may indicate that, in imitating a newly-acquired habit, the imitation must be literal and without any deviation. It is also possible that those showing this form of predation were all adults and that the others trying to follow suit were immatures from the previous year. Among the sanderlings, over half were in almost complete winter plumages.

I saw no evidence of resentment on the part of the turnstones at being robbed repeatedly. L. T. S. NORRIS-ELYE, Winnipeg, Man.

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WALKER PRIZES IN NATURAL HISTORY

The Boston Society of Natural History has recently announced the Walker Prizes in Natural History for 1946. Two prizes, of sixty and fifty dollars respectively, may be awarded at the discretion of the judges for the best papers on insects. The first prizes may be increased to one hundred dollars for a paper of exceptional merit.

The papers must embody the results of original unpublished research. The scope of the competition for 1947 is announced as any subject in the field of fungi. Full information may be secured from:

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Vol. 59 NOVEMBER - DECEMBER, 1945 No. 6

# The CANADIAN FIELD-NATURALIST

Museum of Comparative Zoology
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# PRELIMINARY REPORT ON THE BIRDS AND MAMMALS OF GLACIER NATIONAL PARK, BRITISH COLUMBIA [1]

*By* J. A. MUNRO
*Okanagan Landing, B. C.*

## INTRODUCTION

THE SELKIRK MOUNTAIN complex, of which the 521 square miles of Glacier National Park is a characteristic sample, has been the scene of many mountaineering expeditions since the building of the Canadian Pacific Railway through Rogers Pass made the region accessible.

Earlier in the history of British Columbia the Selkirks were considered an all but impassable barrier to travel. The stark peaks, the great glaciers, the narrow clefts of valleys and, more particularly, the dense forests with their tangles of underbrush and fallen trees were indeed formidable obstacles. Travellers by-passed this barrier. Even the Indians avoided such bleak and forbidding territory and it is said that no traces of Indian trails or occupation have been found in the Selkirks.

Mountaineering and scientific expeditions during the past 50 years have made known the geographical and geological features of the park; study of the flora has received considerable attention but, so far as I am aware, there has been no attempt to compile a list of the vertebrate fauna. One reason for this omission may have been that the relative scarcity of animal life deterred the investigator so long as other richer fields remained unexplored. No doubt another reason also was the difficult character of the terrain.

This preliminary report presents the results of two weeks' field work at Glacier (July 28 to August 10, 1942), together with the information obtained from park wardens and other residents interested in wild life and what data of historical value are contained in the publications to which I have had access.

## PREVIOUS WORK IN THE PARK REGION

According to the information now available three small collections of mammals were made in the park over 40 years ago. The first probably made by Dr. and Mrs. Charles Schnaffer, is in the Philadelphia Academy of Sciences, Philadelphia. The second, made by Dr. F.M. Chapman during July, 1901, is in the American Museum of Natural History. The third is thought to be in the United States National Museum, Washington, D. C.; the name of the collector is not known. The only data available concerning these collections are references to specimens in various numbers of the North American Fauna Series. These have been included in the annotated list of mammals that comprises part of the present paper.

John Macoun is known to have visited the park in early years and he makes references to four species of birds observed or collected at Glacier (14). F. M. Chapman definitely mentions a total of nine species of birds in connection with this locality (2). So far as known no other collections of mammals or birds were made in the park prior to my visit in 1942.

The literature on Glacier Park and the Selkirk Mountains generally is concerned chiefly with the history of exploration, the geography, physical aspects and the sport of mountaineering. It contains few references to wild life and these mostly relate to the more conspicuous animals, mountain goat, bear, hoary marmot and pika. Such items as are considered of historical value have been included in the following pages.

None of the early explorers in the Gold Range and Selkirks seemed interested in wild life except as a source of food and as targets. Thus W. Moberly, in reference to the origin of the name Eagle Pass:- "I arrived at the Eagle River and on top of a tree near its

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mouth I saw a nest full of eaglets, and the two old birds on a limb of its same tree. I had nothing but a small revolver in the shape of firearms. This I discharged eight or ten times at the nest, but could not knock it down." (Moberly, as quoted by Wheeler in 'The Selkirk Range', 18).

Some of those that followed showed an equal lack of tolerance for wildlife. The Reverend Spottswood Green (4) writes with gusto of his encounters with grouse, marmots and pikas, one of the latter he "succeeded in killing with the spike of an ice axe." Of bears he has this to say, "If you want to shoot bears in summer you must have dogs to hunt them and bring them to bay."

This author appears to have been a careless observer of wild life and some of his statements are inaccurate. Thus he writes "The little chief hares, about the size of a rat were common............a beast called the Sewelell also live in these boulder heaps, and is remarkable for its habit of collecting flowers." The little chief hare (pika) is, of course, the animal that cuts the flowers; the Sewelell (mountain beaver) is found in Canada only in the extreme western portion of the British Columbia mainland, south of the Fraser River. Green writes also of chipmunks scrambling up and down his tent at night, of flushing a brace of snipe high up in the Asulkan Valley and of "numberless small animals of the marten and squirrel family inhabiting the forest." None of these statements are acceptable.

Another early writer (20) gives this account of wild life in the vicinity of Glacier............ "On the mountains are numerous herds of mountain goats and sheep, while the forests abound in bears............ the black bear and the grizzly or silver tip. During the berry season these animals frequent the valleys and are often seen by the railroadmen even near the Glacier House. One gentleman had the good fortune to shoot a black bear from a window of the hotel last year. Of course, there is practically no danger from even the grizzly bear in this immediate vicinity; as they have learned to fear man from being frequently shot at, and have long since lost the ferocity which they sometimes show in extremely wild and unfrequented regions".

Wheeler's work "The Selkirk Range", (18) has several interesting references to wild life and in the appendix is Professor John Macoun's "Notes" on the natural history of the Selkirks and adjacent mountains. Little of Macoun's material has particular reference to the park and unfortunately the majority is without dates or precise locality. Another publication by Wheeler and Elizabeth Parker (19) contains a list of birds observed in the summer of 1908, chiefly at Rogers Pass, by a member of the Canadian Alpine Club. Eleven species are mentioned but several of these are believed to be wrongly identified. Still another work of general interest gives an account of mountaineering trips along the summit of the range in Glacier National Park in 1908-1910 and refers incidentally to grizzly bear, hoary marmot, wood rat, porcupine, pika and golden eagle (16).

## PHYSIOGRAPHY

After only two weeks spent in the park it would be idle to attempt a detailed description of its physical geography, particularly as this is well known through the accounts of geographers and mountain-climbers. However, certain obvious features of direct biological significance require mention.

The three warden districts, into which the park has been divided for administrative purposes, follow more or less definite physical boundaries that also are biotic boundaries in respect to some animal populations. Thus District No. 1, at the highest base level, has little range suited to members of the deer family and these only rarely are seen there. The snow fall is the heaviest in the park and its great depth, burying all deciduous growth except the taller cottonwoods in the valleys, restricts the availability of food in winter and definitely limits the number of animal species that can exist. For example, there appear to be no records for ruffed grouse in this district. Deep snow may also be the limiting factor in the case of blue grouse and Franklin grouse, although it is realized that these grouse browse on conifer needles in the winter. The red fox, snowshoe hare, and coyote are included also in this category.

District No. 2, on the eastern watershed, is substantially different. It includes the partly swampy valley of the Beaver River (Purcell Trench) and comparatively large tracts of alpine summit, that on Bald Mountain in the Purcell Range approximating 20 square miles. The base level is lower, the snowfall is less and there is greater variety of vegetation. Because of its direct connection with the Columbia Valley and the presence of upland summer pastures it serves as a summer range for mule deer and white-tail deer. Wapiti and moose have invaded the district from the same region and probably are now permanently established. District No. 2 also contains summer and winter range for caribou, streams and swamps suitable for beaver, habitat for a small population of Canada goose and mallard, and, finally, it can be assumed that a larger number of small bird species, both resident and visitant, occur there than in the higher portions of the park. In reference to forest conditions in the Beaver River Valley early writers emphasize the great size of the trees. They write also of the almost constant forest fires. Thus Green (4) referring to the charred and burnt forest along the valley of the Beaver states that "in some places the timber was destroyed all the way from the railway down to the river and up to the mountain summits beyond". Undoubtedly the after effects of such fires was to produce a different type of range and a changed biota.

District No. 3 on the west drainage slope includes deep, narrow valleys through which run the Illecillewaet and Incomappleux rivers, and a largely unexplored territory of high mountain terrain about which little was learned save its difficulty of access.

Field work was restricted to a small area which could be reached on foot from the vicinity of Glacier. The following account has reference to this section of the park.

It is a region of high, rugged mountains, their bases covered with dense forests, their jagged peaks rising high above glaciers and great ice-fields. Intervening valleys are V-shaped and precipitous including little bottom land, and channeled by glacial streams that pound over boulder-strewn courses. Other streams cascade down the mountain sides; all are tributary to the Illecillewaet River.

A characteristic feature of the landscape are the "slides" where snow-avalanches year after year roar down the steep slopes to pile up in the valleys below. Some are extensive, several miles across as on Avalanche Mountain, others less wide are pyramid-shaped with a narrow apex. All are clear of conifers and the lighter green of the prevailing alder growth is in striking contrast to the dark forests that outline their flanks. Each winter the alders are flattened to a horizontal position with the accumulated weight of snow and in spring their upper portions spring back to an upright position. Travel through them is arduous in the extreme. At a distance some slides are reminiscent of the chapparal-covered slopes of California mountains.

The forests with their luxuriant vegetation, their rough floors where the interstices between fallen and crumbling tree trunks are filled with devil's club and underbrush, and their prevailing dampness are similar to those on the coast of British Columbia. They are penetrated only with great difficulty and probably are little different in this respect from what they were 50 odd years ago when Green (4) wrote "It is difficult to give anything like an adequate idea of what such forests as these are like. Besides the noble pines in the prime of life, dressed with lichens, the young trees growing up, the thickets of blueberry bushes, rhododendrons and the devil's club with its long broad leaves and coral red fruit, but most terrible thorns; there is the network of fallen trees, some rotting on the ground, others piled on top of these at every possible angle, with spikes of broken branches sticking out like spiders. Again overhead are trees recently fallen, jammed against others, some only needing a push to bring them down. Getting through such a tangle is all hand and knee work".

Although probably many of the oldest trees have been logged off since Green visited Glacier, today the forests are equally forbidding and travel off the trails quite as difficult as it was then.

On certain dryer portions of the forest floor in relatively open sections vivid mosses carpet the ground and the disintegrating logs. The abundance of flowering plants at all altitudes has been described by many visitors to the region and needs only mention here.

The glens at the heads of the valleys and the alps on or near mountain summits are of small extent, the largest probably being in Cougar Valley a place that was not visited. Two small lakes, Marion Lake on Mount Abbott, said to be five acres in extent but actually much smaller, and Black Lake below Rogers Pass, were inspected. Neither is of sufficient size to exert much influence on the biota.

According to Dominion Meteorological records the average precipitation at Glacier for a 35 year period was 53.55 inches, the greatest recorded in any area east of the coast mountain ranges. In contrast it is to be noted that at Golden on the east, in the Columbia Valley, the average precipitation for a 28 year period was 17.90 inches. On the west slope of the Selkirk Mountains and in the Gold Range the rainfall is less; farther west is the so-called Dry Belt. Thus at Revelstoke the average precipitation for a 35 year period was 40.03 inches and at Kamloops for a 17 year period 10 inches. According to the records of the Canadian Pacific Railway, the average snowfall at Glacier for the years 1896 to 1940, inclusive, was 32 feet 4 inches, the highest being 46 feet in 1918 and the lowest 15 feet 3½ inches in 1906. The average mean maximum temperatures in Degrees Fahrenheit for the period 1931 to 1938, inclusive, in the localities mentioned are: Glacier 27.25; Golden 26.83; Revelstoke 32.; Kamloops 38.33.

## LIFE ZONE CLASSIFICATION

The use of the term biotic area in connection with life zone classification has been explained in a preliminary report on the birds and mammals of Kootenay National Park (13). In Glacier National Park three biotic areas, namely, Columbia Forest, Sub-alpine Forest and Southern Alplands are represented.

The Columbia Forest biotic area may briefly be defined as an area of rain forest in the Selkirk and Monoshee Mountain ranges altitudinally below the Sub-alpine Forest biotic area. The latter is tentatively delimited as the coniferous forest in the southern part of the Province altitudinally above the Columbia Forest and parkland forest type of the Dry Forest biotic area and altitudinally below the Southern Alplands biotic area. The last named consists of those parts of the Province above timber-line south of the Skeena River and Peace River watersheds.

The Columbia Forest biotic area as represented in Glacier National Park includes the valleys of the Beaver, the Illecillewaet and the Incomappleux rivers. It is characterized in these lower valleys by a predominant deciduous tree growth in which black cottonwood *Populus trichocarpa* is conspicuous. It includes also the lower slopes of the mountain, to an altitude less than 5000 feet in most sections, and the higher valleys. Here the forest is composed of giant cedar *Thuja plicata*, western hemlock *Tsuga heterophylla*, mountain hemlock *Tsuga Mertensiana*, Engelmann spruce *Picea Engelmanni* and alpine fir *Abies lasiocarpa*. An underbrush that usually forms a heavy growth includes devil's club *Oplopanax horridum*, rhododendron *Rhododendron albiflorum* and at least two species of *Vaccinium*.

Two distinct vertebrate habitats in this biotic area viz.: the coniferous forest and the areas covered by deciduous growth, received a limited amount of detailed study.

*Coniferous forest.* The character of this forest has been noted. It contained little bird life in August, the species seen more than once being hermit thrush, winter wren, golden-crowned kinglet and chestnut-backed chickadee. The presence of the latter, which was observed also in the last tall trees near timberline, is worth special mention. This is the common chickadee on the coast of British Columbia but apparently is absent from the territory between the coast mountain ranges and the western edge of the Columbia Forest biotic area.

Mammals most abundant in this habitat are cinereus shrew, dusky shrew, marten, red squirrel and red-backed mouse. Water shrew and long-tailed meadow vole occur along several of the numerous small streams.

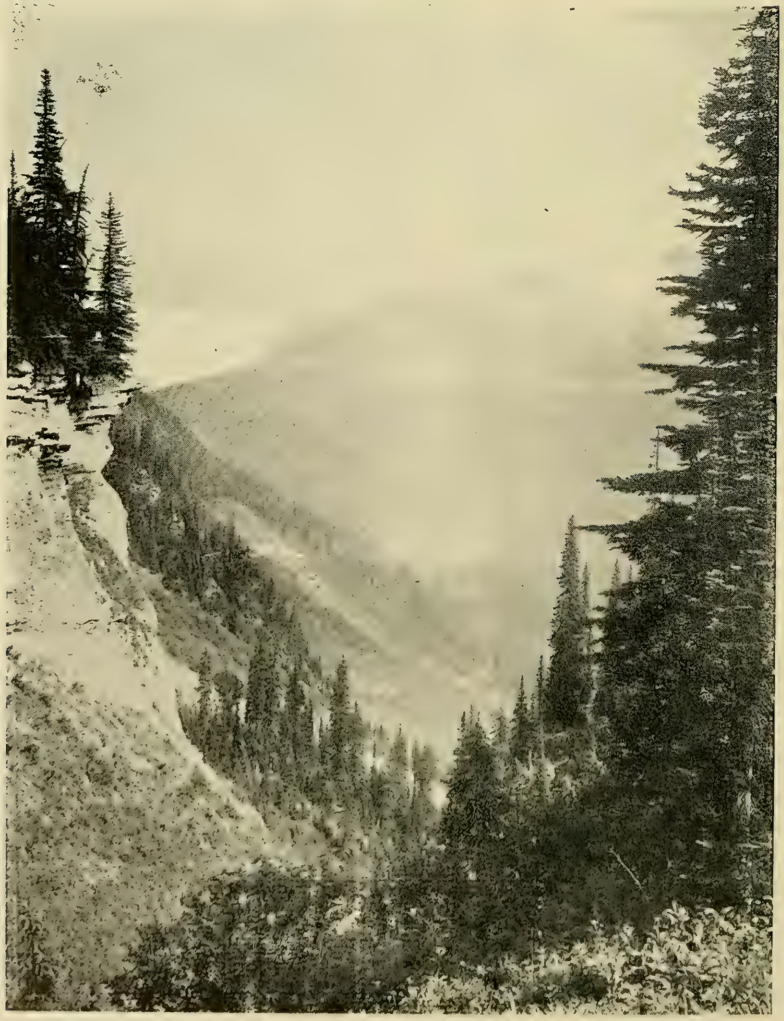
*Areas covered by deciduous growth.* This includes the bottoms of some of the narrow valleys at their lower altitudes, and old clearings where the prevailing tree growth is mountain alder, *Alnus tenuifolia*, willow, *Salix*, black cottonwood, trembling aspen, *Populus tremuloides*, western birch, *Betula papyrifera* var. *occidentalis*, mountain birch, *Betula fontinalis* and mountain ash, *Sorbus sitchensis*. Here also is a varied and abundant shrubbery, including red elder, *Sambucus racemosa*, black elder, *Sambucus melanocarpa*, thimble berry, *Rubus parviflorus*, goatsbeard, *Aruncus sylvester*, and pink spirea, *Spiraea densiflora*; bracken, *Pteridium aquilinum* var. *latiusculum*, and tall cow-parsnip, *Heracleum lanatum* also are conspicuous in more open places. Old moraines and rock slides bordering some of these areas are an integral part of the habitat, as the animals inhabiting them are dependent for food upon the adjacent vegetation.

An important example of this habitat is of comparatively recent man-made origin. It is an open flat, the site of Glacier House torn

Mount Sir Donald from Upper Cougar Valley, Glacier National Park.

Marion Lake and Swiss Lake, Glacier National Park, British Columbia.

Rogers Pass, Backbone of the Selkirks, Glacier National Park.



Cougar Valley and Lookout Point from Nakima Caves, Glacier National Park, down years ago and of which nothing remains except the stone foundations half hidden by shrubbery and, in August, by sheets of fireweed in blossom. So also the old Canadian Pacific grade through Rogers Pass where an encroaching growth of deciduous trees and shrubs is fast obliterating the vestiges of human enterprise. Prominent here are the ruined snow sheds. Avalanches and fires have in places reduced these structures to heaps of boulders and rotted timbers half hidden by the prevailing rank growth of vegetation. Such provide suitable nitches for hoary marmots, pikas, Columbian ground squirrels and chipmunks. This habitat contained the largest variety of birds and mammals, some of the former probably representing quite recent invasions from the lowlands. Further investigation of the slide areas, most of which are quite old and dominated almost exclusively by mountain alder, may show they are sufficiently different to warrant separate consideration in a study of animal habitats.

The Sub-alpine Forest biotic area covers the higher portions of the mountains below timber line. On the lower sections alpine fir is dominant. On higher, rocky and semi-open terrain are scattered alpine fir and Engelmann spruce of small size, dwarfed mountain hemlock and white bark pine, *Pinus albicaulis*. There is little underbrush; heathers, *Cassiope* and *Phyllodoce* and dwarf spirea, *Lutkea pectinata*, first appear.

This biotic area is the chief hunting ground of grizzly bear. Other mammals and birds associated with it are mountain weasel, wolverine, hoary marmot, golden-mantled ground squirrel, sparrow hawk, interior blue grouse, Townsend solitaire and pine grosbeak.

The southern alplands biotic area is the region of alplands, alpine glens, moraines, mountain peaks and snowfields above timberline. The alps are open, usually sloping, territory above 6500 feet altitude, generally dotted with boulders and blocks of sedimentary rock. The ground is covered with turf, heathers, dwarf spirea, saxifrages and other flowering plants. Narrow alpine glens have a rich flora in which tow-head baby, *Anemone occidentalis*, false hellebore, *Veratrum viride*, and valerian, *Valeriana sylvatica* are conspicuous. Mountain goat is restricted to this biotic area and it is summer range for mountain caribou. Characteristic birds are golden eagle, white-tailed ptarmigan, American pipit and rosy finch.

### BIRDS

Early August is not the best time of year in which to assess a bird population. The season of song is over, birds are comparatively silent and the relative fearlessness of adults on their territories, conspicuously manifested by some species earlier in the season, is no longer apparent. Young birds are mostly out of the nest and in many cases have travelled some distances from the nesting territories. The following remarks are made with these facts in mind and realizing that an investigation earlier in the season probably would modify the impressions received.

The sections of the park visited were not well supplied with birds, either in respect of the number of species or of the total of individuals. Birds of all kinds seemed to be more shy and wary than is usual elsewhere at this season. Only a few species could be called "common" and by that is meant species which were seen daily in different localities. In this category are Wilson warbler, hermit thrush, chipping sparrow, and Oregon junco. A point of interest in connection with these species was their altitudinal range which included various habitats from the lowest levels at 3800 feet to timber-line at 6500 feet.

One might walk along the forest trails for several hours and not hear or see a bird of any kind. Birds had to be hunted for and were it not for the use of various methods of exciting them and so making them more conspicuous, few observations would have been recorded from this habitat. In the subalpine zone, birds were detected more readily but the number of individuals seen there was small. As indicated in a foregoing section, the areas in which deciduous tree growth predominated were the most productive. Along Rogers Pass a thin trickle of migration was under way and the observed population there changed from day to day.

The region is rich in berry-producing shrubs and it might naturally be expected that these would attract birds. Such was not the case, however, and no birds were seen feeding on berries. It was noted that the spruce cone crop was small, a condition that might account for a scarcity of Clarke crow, siskins and crossbills.

Some species, for example red-shafted flicker and mountain blue-bird, probably find here their limit of toleration and their presence in small numbers indicates a recent expansion of range into sub-marginal territory.

The heavy annual snow-fall that covers most or all of the deciduous growth evidently is the factor responsible for the relative scarcity of winter wren, the complete absence of ruffed grouse, and the reported absence or scarcity of such winter visitants as bohemian waxwing, snow bunting and redpoll.

Of the 65 species listed here 33 were personally observed. The majority of the remainder are included on the basis of satisfactory evidence submitted by park wardens and by Mr. Norman Brewster of Glacier; a smaller number of records were abstracted from the literature. It may be expected that future observations in the park area as a whole, will add a number of species to this list. Amongst them will likely be the following: goshawk, sharp-shinned hawk, red-tailed hawk, bald eagle, osprey, pigeon hawk, kingfisher, American three-toed woodpecker, solitary sandpiper, short-eared owl, American raven, Hudsonian chicadee, mountain chickadee, brown creeper, ruby-crowned kinglet, violet-green swallow, orange-crowned warbler, Audubon warbler, white-winged crossbill and savannah sparrow.

## ANNOTATED LIST OF BIRDS

**Canada Goose.**
*Branta canadensis.*—A few pair are reported to nest along the Beaver River (Park Warden Martin). A flock of 14 was seen flying over Asulkan Pass in May, 1941 (Brewster).

**Mallard.**
*Anas platyrhynchos.*— Nests in small numbers along the Beaver River and has been seen on ponds at the summit of Bald Mountain (Martin).

**Harlequin Duck.**
*Histrionicus histrionicus.*— Nests regularly on the Illecillewaet River near Glacier, where a female with brood was seen on July 20, 1942. Warden MacDonald reported seeing a brood of four early in June, 1942, on Flat Creek and a brood near the same place in the summer of 1941.

**American Merganser.**
*Mergus merganser.*— Reported from Beaver River where it probably nests (Martin).

**Golden Eagle.**
*Aquila chrysaetos.*— Reports indicate that the small number in the park are summer visitants only; Fidelity Mountain is mentioned as a possible nesting place. It appears early in spring and is often seen by skiers who visit Asulkan Pass at that season. Brewster described witnessing aerial evolutions in spring as performed by a pair, evidently part of the courtship display. Neither marmots nor ground squirrels would be available as food in early spring and it is not known what food could then be obtained. Palmer (16) writes: "The arch enemies [of Marmots] are eagles, which we saw often. The birds have a crafty way of swooping suddenly over a ridge and catching the Marmots away from their holes". None was seen during the time spent at Glacier in 1942.

**Marsh Hawk.**
*Circus hudsonius.*— A male of the year that flew over the camp at Glacier in the evening of August 8, 1942, was the only one recorded. Warden Mann reported seeing a hawk, evidently an immature marsh hawk, on the Bostock Summit in August, 1942.

**American Sparrow Hawk.**
*Falco sparverius.*— An adult male at Rogers Pass, apparently migrating August 3, 1942, and another in the sub-alpine zone on Abbott Mountain, August 7, 1942, were the only records obtained.

**Blue Grouse.**
*Dendragapus obscurus.*— Reported by Mann and Martin to be fairly plentiful on semi-open mountain slopes at high altitudes. Apparently it frequents a sub-alpine habitat in summer and descends into the valleys to spend the winter. Brewster reports seeing seven on a slide near the Nakimu Caves road late in April, 1942. These altitudinal migrations are the reverse of what takes place on the coast of British Columbia where the blue grouse spend the spring and summer close to sea-level and move into the mountains in early fall, the adult males preceding the females and young by a month or so.

**Franklin Grouse**
*Canachites franklini.*— Apparently less common near Glacier than elsewhere in the park. Brewster saw a male displaying on Hermit Mountain, July 27, 1942; Mann reported a brood accompanied by both male and female on the Nakimu Caves road, August 1. A brood of seven half-grown young was seen on Rogers Pass August 2 and several were reported on the Glacier Crest trail August 4. Martin described it as common along the Beaver River

trail above 4,000 feet and MacDonald reported seeing six broods during July, 1942, in the Flat Creek area.

**Ruffed Grouse.**

*Bonasa umbellus.*— Confined to the lower valleys within the Columbia Forest biotic area. Martin describes it as "common" in the valley of the Beaver River and it probably also occurs in the Flat Creek region. No records obtained for the higher levels, where as stated earlier, deep snow covers nearly all deciduous growth and makes this region entirely unsuitable for ruffed grouse.

**White-tailed Ptarmigan.**

*Lagopus leucurus.*— Macoun and Macoun (14) record seeing three large broods on Avalanche Mountain August 24, 1885. On Hermit Mountain, August 8, 1902, Wheeler (18) met with a "fine" flock and states that "this species of grouse is very plentiful in the Selkirks and may be seen on nearly all the higher summits." It is less common now. Brewster saw two on Hermit Mountain July 27, 1942, one of which was photographed. Mann has not seen it in District No. 1 but reports it from the summit of Bostock Range, August 1942. Martin notes it as nesting on the summit of Bald Mountain. It is reported to occur in small flocks during winter along the Canadian Pacific Railway at Stony Creek, Glacier and Flat Creek, also in Rogers Pass.

**Spotted Sandpiper.**

*Actitis macularia.*— Reported by Mann as frequenting the Beaver River.

**Horned Owl.**

*Bubo virginianus.*— Reported from Stony Creek and Glacier; probably not resident at the latter place.

**Snowy Owl.**

*Nyctea nyctea.*— Reported as an occasional winter visitant.

**Black Swift.**

*Nepoecetes niger.*— On a bright clear day, August 4, 1942, five were examined in the Flat Creek area with 6X binoculars as they circled about the face of Mount Cheops, and approximately 20 were seen on August 9.

**Vaux Swift.**

*Chaetura vauxi.*— On July 30, 1942, a rainy day, four were observed at close range flying over the old Canadian Pacific grade above Glacier.

**Rufous Hummingbird.**

*Selasphorus rufus.*— On August 1, 1942, in Rogers Pass an adult male was called up within a few yards. Reported also from Glacier Station and Flat Creek.

**Red-shafted Flicker.**

*Colaptes cafer.*— One seen or heard daily in Rogers Pass from August 2, to August 9, 1942. Reported by Brewster as nesting in an old hemlock near Glacier Station in the summer of 1942. As pointed out earlier this species probably finds its limit of toleration in this biotic area and the population is assumed to be small.

**Pileated Woodpecker.**

*Ceophloeus pileatus.*— Reports of it being seen near the Glacier settlement and at Stony Creek were received. Fresh excavations in a white-bark pine at about 6500 feet on Mount Abbot, August 7, 1942, were thought to be the work of this species.

**Yellow-bellied Sapsucker.**

*Sphyrapicus varius.*— Reported by Mann as seen near Glacier and at Stony Creek.

**Hairy Woodpecker.**

*Dryobates villosus.*— Reported from Glacier and Stony Creek: Mann.

**Downy Woodpecker.**

*Dryobates pubescens.*— Reported from Glacier and Stony Creek: Mann.

**Alder Flycatcher.**

*Empidonax trailli.*— A small flycatcher in an alder thicket in the Asulkan Valley, August 1, 1942 was identified as this species.

**Hammond Flycatcher.**

*Empidonax hammondi.*— In August, 1942, several individuals were seen in Rogers Pass and in the thick forest. Another, perched on a boulder-top in a rock slide near the head of Asulkan Valley, flew almost vertically into the air in pursuit of a small moth. An adult female taken on August 3 had nested and was starting to moult.

**Olive-sided Flycatcher.**

*Nuttallornis mesoleucus.*— Reported from Stony Creek: Mann.

**Barn Swallow.**

*Hirundo erythrogaster.*— A pair nested under the eaves of Glacier House in 1901 and 1907, Chapman (2). Not seen in the park in 1942.

**Cliff Swallow.**
*Petrochelidon albifrons.*— Reported to nest under the eaves of the Canadian Pacific Railway Station at Glacier.

**Canada Jay.**
*Perisoreus canadensis.*— Two birds frequented the vicinity of the Alternative Service Camp near Glacier in August, 1942. None was seen elsewhere, but it is said to be more common during the winter. Reported also from Stony Creek.

**Steller Jay.**
*Cyanocitta stelleri.*— Macoun and Macoun (14) report collecting a specimen at Glacier in August 1885, and note it as numerous. From July 29 to August 7, 1942, one to three individuals were seen almost daily.

**American Magpie.**
*Pica pica.*— Evidently rare in the park. One was reported at Stony Creek, April, 1938 by Mann, and it is mentioned in a list of birds seen in Rogers Pass (19).

**Crow.**
*Corvus brachyrhynchos.*— A small number of crows are summer visitants to the valley bottoms of the Illecillewaet and Beaver Rivers. According to the records in park wardens' diaries it arrives in March: Stony Creek, March, 1938—20, March, 1939—30, March, 1940—50, March, 1941—17: Glacier, March, 1940—6, March, 1941—6: Flat Creek, March, 1939—9. On August 2, 1942 three settled for a few minutes in the spruces near the Alternative Service Camp, this being the only time it was seen by me above the settlement where a small number spent the summer and undoubtedly nested.

**Clarke Nutcracker.**
*Nucifraga columbiana.*— Two or three were heard or seen daily on Avalanche Mountain and in Rogers Pass from August 2 to August 9, 1942. Two were seen August 7 on Mount Abbott at the 6000 foot level. Reported to be more plentiful in winter and at Stony Creek it frequently came to Mann's feeding station.

**Chestnut-backed Chickadee.**
*Penthestes rufescens.*— A small group of about six apparently adults with full-grown brood was called up within a few yards on July 29, 1942. Chickadees heard on two other occasions were identified as this species.

**Red-breasted Nuthatch.**
*Sitta canadensis.*— Apparently scarce at Glacier and was heard once only, July 28, 1942. Reported by Brewster as observed in the spring of 1942.

**Dipper.**
*Cinclus mexicanus.*— Resident in the park on the mountain streams; reported as wintering regularly on Asulkan Brook. Chapman (2) found a nest with five young near Glacier in July, 1901.

**Winter Wren.**
*Nannus hiemalis.*— Probably a summer visitant only in the Glacier region. Four recorded between July 30 and August 6, 1942; and a juvenile was caught in a mouse trap. Seen by Chapman near Glacier (2).

**American Robin.**
*Turdus migratorius.*— None was seen at Glacier but residents informed me that a small population had raised young about the settlement earlier in the summer and then moved out. The species is mentioned by Chapman (2).

**Varied Thrush.**
*Ixoreus naevius.*— Chapman (2) states that in the forests about Glacier from July 18 to July 20, 1907, about 50 were heard but none was seen. It was by no means so common in August, 1942. Several were heard on Avalanche Mountain; a brood of full-grown young was seen near the same place on August 8 and the following day an adult male was collected.

**Hermit Thrush.**
*Hylocichla guttata.*— Noted by Chapman (2) as common about Glacier in July, 1907. It could be so described in 1942 and was observed in various habitats up to the sub-alpine level at 6500 feet. In several places adults acted as though still caring for young on August 5. A migration of adults and young through Rogers Pass was observed between August 2 and August 8. At this time the young on migration were moulting to first winter plumage.

**Olive-backed Thrush.**
*Hylocichla ustulata.*— Chapman (2) writes that at Glacier this species was even more common than the hermit thrush. It was not identified positively by me although several thrushes seen momentarily in thick brush may have been this species.

**Mountain Bluebird.**
*Sialia currucoides.*— Noted by Mann as a spring transient at Glacier.

**Townsend Solitaire.**
*Myadestes townsendi.*— One seen August 7, 1942, in the sub-alpine zone on Mount Abbott.

**Golden-crowned Kinglet.**
*Regulus satrapa.*— One of the commonest birds at Glacier. It was heard or seen daily in the forests; recorded also in the last area of small timber at the head of Asulkan Valley, August 5, 1942, and on Mount Abbot at 6000 feet on August 7, 1942.

**American Pipit.**
*Anthus spinoletta.*— Recorded by Saunders in Macoun and Macoun (14). "A single specimen heard singing on Avalanche Mountain June 24, 1906." Six were seen on an alpine slope on Mount Abbott, August 7, 1942. It is probable that pipits nest on many of the alps within the park area.

**Bohemian Waxwing.**
*Bombycilla garrula.*— Records in winter by Mann at Glacier and at Stony Creek.

**Cedar Waxwing.**
*Bombycilla cedrorum.*— A single individual, evidently a transient, seen flying out from a cottonwood in Rogers Pass on August 3, 1942 is the only record.

**Warbling Vireo.**
*Vireo gilvus.*— Small numbers seen on migration at Rogers Pass on August 2 and subsequently. A young bird taken was moulting to first winter plumage.

**Myrtle Warbler.**
*Dendroica coronata.*— A single male of this species seen in an alder thicket in Asulkan Valley on August 5, 1942, is the only record.

**MacGillivray Warbler.**
*Oporornis tolmiei.*— An adult male was called up in an alder thicket near the old Canadian Pacific section house on July 30, 1942. This bird had food in its bill and by its excited behaviour evidently was feeding young. A male, probably the same one, was seen in the same place the following day, and from August 2 to August 4 several others, thought to be on migration, were recorded in Rogers Pass.

**Wilson Warbler.**
*Wilsonia pusilla.*— This proved to be one of the commonest birds in the park and was seen frequently in deciduous growth up to near timber line. One was noted amongst small alpine fir on Mount Abbott at 6500 feet, August 7. On July 30 a female was observed feeding a full-grown young; the male in full moult was in the close vicinity. A number of transients were met with in Rogers Pass at this time.

**Cowbird.**
*Molothrus ater.*— A female of this species was observed daily in the Glacier settlement during the first week in August.

**Evening Grosbeak.**
*Hesperiphona vespertina.*— Observed at Stony Creek by Mann.

**Pine Grosbeak.**
*Pinicola enucleator.*— On August 7, 1942, an adult male was seen and heard singing in the semi-open woods at 6000 feet on Mount Abbott The following day another was observed near Glacier.

**Rosy Finch.**
*Leucosticte tephrocotis.*— Macoun and Macoun (14) report seeing a pair and four young on Avalanche Mountain August 4, 1885. On Mount Tupper, August 9, 1902, Wheeler observed a flock of birds which apparently were this species ; he writes: "We also saw on the Tupper neve a flock composed of hundreds of small birds. They were about the size of snowbirds and probably some such species but not yet decked in their more brilliant winter pluage. They seemed to be having a fine feed upon myriads of insects with which the surface of the snow-field was covered" (18). Brewster reported seeing at least 30 on the heather slopes of the Sir Donald Range at 7000 feet, August 3, 1942.

**Common Redpoll.**
*Acanthis linaria.*— Mann reported that redpolls were common at Glacier in the winter of 1941-42 feeding on alder seeds. In winters of normal heavy snowfall the alders are buried and this food is not available.

**Pine Siskin.**
*Spinus pinus.*— A flock of 10 seen by Mann two miles west of Glacier in early August, 1942.

**American Goldfinch.**
*Spinus tristis.*— Reported by Mann and others as visiting Rogers Pass and the Glacier settlement. This unusual record requires verification.

**Crossbill.**
*Loxia curvirostra.*— A single crossbill, believed to be this species, was heard near Marion Lake on Mount Abbott, August 5, 1942.

**Vesper Sparrow.**
*Pooecetes gramineus.*— In Wheeler and Parker (19) appears a reference to a vesper sparrow in song at Rogers Pass in the summer of 1908. This species has a great altitudinal range during the nesting season and the identification probably can be accepted.

**Oregon Junco.**
*Junco oreganus.*— One of the commoner species in the park, it was seen daily at various places. An adult female was observed feeding full-fledged young in a glen near the head of Asulkan Valley on August 5 and another with brood of similar age was recorded in Rogers Pass on August 8.

**Chipping Sparrow.**
*Spizella passerina.*— Seen in small numbers at various levels up to 6500 feet. Three in Rogers Pass on August 8, 1942, were evidently on migration.

**White-crowned Sparrow.**
*Zonotrichia leucophrys.*— Mentioned by Chapman (2) as occurring at Glacier and seen there and at Stony Creek by Mann. One called up in an alder thicket in Asulkan Valley, August 5, 1942, was the only one recorded personally.

**Fox Sparrow.**
*Passerella iliaca.*— A fox sparrow was heard singing on the slope of Avalanche Mountain, August 3, 1942. It probably nests in the subalpine zone throughout the park.

**Song Sparrow.**
*Melospiza melodia.*— A juvenile in first plumage was collected in Rogers Pass on August 3, 1942, and later in the day three others not identified as to age, were seen in the same general locality. This specimen has the blackish plumage characteristic of the young of the subspecies *Melospiza melodia inexpectata* Riley.

**Snow Bunting.**
*Plectrophenax nivalis.*— Observed in winter by Mann at Stony Creek.

## MAMMALS

The trapping of small mammals was carried on between the 3800 and 4200 foot levels in the vicinity of Glacier during the period July 28 to August 10. From the results it would appear that mice and voles were at or near the peak of abundance. Observations of hoary marmots, Columbian ground squirrels, pikas and red squirrels were made as opportunities occurred. Information concerning the larger mammals was obtained chiefly from the park wardens and from Mr. Norman Brewster of Glacier. The warden's reports concerning the comparatively recent appearance of wapiti and moose and the increase of deer in district No. 2 are of particular interest and suggest the following observations: It is generally accepted that with the recession of the ice-cap following the last glacial period, and the consequent amelioration of climate, animal populations gradually expanded into territories that a changing environment rendered suitable for occupation. These events did not take place only in a remote past but represent a continuing process. There is much evidence to show that animal populations still are expanding and some of the movement is due perhaps to the current glacial recession. The latter is a matter of record and it is exerting a perceptible influence on environment not only in this park but elsewhere in western America. Thus streams are becoming smaller, boggy places are becoming dryer and annual precipitation is decreasing. With these facts in mind it is considered not improbable that the gradual invasion of the Beaver River by members of the deer family is an instance of the continuing process referred to.

The species listed in the following section probably represent a fairly complete record of the park's mammalian fauna. In addition to the species recorded Richardson vole will almost certainly be found in some of the high mountain valleys and several species of bats can be expected to occur. Only one bat was seen and this was not identified. It is not known if the house mouse has reached the park; trapping around buildings produced white-footed mice only.

### ANNOTATED LIST OF MAMMALS

**Cinereus Shrew.**
*Sorex cinereus.*— An abundant species that was trapped under logs in the forest, in patches of rhododendron, beside streams and in open grassy places; on two occasions live specimens were seen along the trails. Reference in

literature to eight specimens of *Sorex cinereus cinereus* (Kerr) in the American Museum of Natural History (12).

**Dusky Shrew.**

*Sorex obscurus.*— Less abundant than the cinereus shrew; a total of six specimens was taken in various types of habitat. Reference in literature to 13 specimens of *Sorex obscurus obscurus* Merriam; one in the Philadelphia Academy of Natural Sciences, seven in the American Museum of Natural History and five in the United States National Museum (12).

**Water Shrew.**

*Sorex palustris.*— Occurs on many of the small mountain brooks. One was taken beside a spring above Glacier, another on the shore of Black Lake.

**Black Bear.**

*Euarctos americanus.*— In certain districts of the park the black bear is probably no less common at the present time than it was 50 years ago. Apparently it generally has been more numerous on the lower levels, notably in the Beaver River Valley. Macoun in Wheeler (18) attributes this to the abundance of skunk cabbage there to which bears are partial. The former author in reference to the period before railway construction, states that: "Bear Creek was named on account of the large number of these animals frequenting its vicinity and that of the Beaver Valley." He refers also to their continued abundance in 1902.

Park Warden Martin believes there was a large increase in population in 1942. Perhaps some of this is more apparent than real and may be ascribed to a movement into the valley from the mountains following a shortage of the berry crop. He mentioned that a large percentage of the bears seen in 1942 were yearlings and that about 50 per cent were brown. He estimates that a total of 40 frequent a mile-wide strip of territory between Connaught and Griffin, a distance of 10 miles. The largest counts available for this district abstracted from wardens' diaries prior to 1942; are: May, 1938-2; September, 1939-17; June, 1940-19; May, 1941-13. These counts apparently were all made from the railroad grade which bears are in the habit of frequenting in search of food refuse thrown from the trains. It seems likely that from this vantage point a fairly accurate idea of the fluctuation in population might be obtained.

In the vicinity of Glacier Warden Mann notes a decrease since 1939, a condition he attributes to the failure of the berry crop in that year and to an increase in the number of grizzly bear in the district. A larger number of black bear have been observed in 1942 and he estimates the total population to be 10 or 12. I saw only one but found fresh sign a number of times. Warden MacDonald at Flat Creek reports seeing between five and ten in each month from May to September, 1941.

**Grizzly Bear.**

*Ursus horribilis.*— Macoun in Wheeler (18) remarks that grizzly were numerous at the summit in 1885 and in reference to an unspecified later period (perhaps 1890-1900) states that "bears are still to be found but they are careful to keep out of sight". Palmer (16) writes of meeting a yearling and later a female with a cub in 1909. Warden Mann stated that prior to 1935 grizzlys rarely were seen and none was resident in District No. 1. In that year a pair moved into the vicinity of Rogers Pass and remained there. Their progeny, and that of several other pairs that appeared later, are the origin of the present population that was estimated in 1942 to be approximately 25. In the spring grizzlys come down into the valleys and in recent years have been seen on the trails close to Glacier.

In District No. 2, according to Warden Martin the population approximates six individuals. He reports an exceptionally large animal resident on Bald Mountain. Another, a very dark specimen, appeared in 1939 and has been seen in spring along the Beaver River bottom.

In reference to District No. 3 MacDonald reports a large male resident on Ross's Peak for several years and reports also meeting an adult on the Flat Creek Trail in May, 1942. It is stated that a grizzly population is resident in the south-west portion of this district.

An account of a grizzly bear attacking a man on Avalanche Mountain, while he was taking a drink at a spring, is given by Macoun in Wheeler (18). I have heard of no other instance of the kind relating to Glacier Park, nevertheless people admit an uneasiness and dislike of the animal. It is met often enough to cause apprehension and there seems little doubt that its presence deters some people from visiting the park. I saw none but examined old workings on Mount Abbot where one had been digging out a ground squirrel.

**Marten.**
*Martes americana.*— Reported to be abundant in Districts Nos. 1 and 2. It is most common in the sub-alpine forest biotic area between 5000 and 6000 feet but occurs also in the river bottoms and in the intervening territory. Several instances were related to me of animals becoming quite tame and frequenting the vicinity of buildings. It seems likely that animals from the park form a considerable proportion of the catch by trappers who have their lines along the park boundaries. A trapper at Beavermouth is reported to have taken 20 in the winter of 1941-42. No information was obtained as to the status of marten in District No. 3 except that one was seen near the cabin at Flat Creek in the spring of 1942.

**Fisher.**
*Martes pennanti.*— No definite record obtained of its occurrence in the park. Mann reported that one was trapped in the winter of 1940-41 at the headwaters of Jumping Creek near the west boundary of the park.

**Short-tailed Weasel.**
*Mustela cicognanii.*— Reported to be distributed through the park and to be common during winter in the Beaver River bottom.

**Mountain Weasel.**
*Mustela frenata.*— Reported as common in the higher forests and on alpine meadows.

**Mink.**
*Mustela vison.*— Rare in District No. 1 where the habitat is unsuitable, and scarce in District No. 2 where signs of its presence are occasionally seen along the Beaver River. Only one animal has been observed by Warden Martin during the past three years.

**Wolverine.**
*Gulo luscus.*— Warden Mann reports that fresh tracks are seen daily during winter patrols. Mr. Brewster reported meeting one on the Illecillewaet neve in April 1941 and said also that fresh tracks frequently are seen in the snow along the railroad track near Glacier. The population in District No. 2 is estimated by Warden Martin to be approximately 12. In the winters of 1940-41, 1941-42, one animal made regular journeys (which in the circuitous manner of travel characteristic of the species extended over a period of two weeks) through a well defined territory. This was down Mountain Creek to Beaver River, south to the vicinity of Connaught, then west to Mountain Creek.

It seems probable that the wolverine is more plentiful in the park than in the surrounding areas.

**British Columbia Red Fox.**
*Vulpes alascensis.*— Rare throughout the park; one reported from the vicinity of Glacier in 1939 on the basis of winter tracks and one seen at Stony Creek in the winter of 1930-31.

**Coyote.**
*Canis latrans.*— Reported as scarce in District No. 1 and uncommon in Districts Nos. 2 and 3. Warden Martin saw several in 1941 and one in 1942 up to the end of July. The opinion was expressed that coyotes come into the district in spring with the deer and follow them out in the autumn. Warden MacDonald has heard coyotes several times near Flat Creek. I found one scat on the Asulkan trail and another on the Mount Abbott trail; these were composed chiefly of hoary marmot hair. Early explorers do not mention this animal and perhaps it may be concluded that its appearance in the park is comparatively recent.

**Timber Wolf.**
*Canis lupus.*— Warden Mann reports seeing one in the winter of 1939-40, the only record obtained of its occurrence in the park.

**Cougar.**
*Felis concolor.*— Evidently very scarce and not resident in the park. Tracks have been seen twice in winter during the past three years both in the Glacier area and in District No. 2.

**Canada Lynx.**
*Lynx canadensis.*— Rare throughout the park; tracks have been seen occasionally in winter.

**Woodchuck.**
*Marmota monax.*— In 1937 Warden Mann found a number on a burnt-over hillside 12 miles south of Stony Creek, both color phases being represented. Warden Martin reports seeing approximately six near the mouth of the Connaught tunnel and two between Stony Creek and Sturdy in 1942. Warden Mann saw one on the Glacier Hotel site in July, 1942.

**Hoary Marmot.**
*Marmota caligata.*— At Glacier it was seen or heard in small numbers from the 4000 foot level to timber line. Approximately eight adults and young inhabited the first quarter mile of ruined snow-sheds west from the Glacier Hotel site. Only four were seen or heard in the Asulkan Valley, a place where early

writers reported it as abundant. Brewster informed me of larger numbers frequenting the Upper Cougar Valley. Warden Martin stated that it inhabits suitable areas along the railroad grade through the park. Reference in literature to seven specimens *Marmota caligata okanagana* (King) in United States National Museum (5).

**Golden-mantled Ground Squirrel.**

*Citellus lateralis.*— One seen amongst low balsam and hemlock near timber line at the head of Asulkan Pass on August 5, 1942; reported from Mount Abbott, Bald Mountain and the Bostock Summit. In this part of the Selkirks it is an animal of the high ridges but farther south is also inhabits the valleys and in recent years has been abundant near Nelson and along Kootenay Lake. Reference in literature to one specimen *Citellus lateralis tescorum* (Hollister) in American Museum of Natural History (9).

**Columbian Ground Squirrel.**

*Citellus columbianus.*— Excepting the mice, voles and shrews this is the most abundant mammal in the park. It is conspicuous along the roadways and in nearly all open places.

In the Glacier region so early as August 5 (1942) its activities had lessened; fewer were visible than had been a week earlier and it seemed clear that some were already hibernating.

**Buff-bellied Chipmunk.**

*Eutamias amoenus.*— Not common in the Glacier area where only two were trapped and three others seen in the course of two weeks. It is reported more common elsewhere in the park at lower altitudes. Reference in literature to three specimens *Eutamias amoenus luteiventris* (Allen) in Philadelphia Academy of Natural Sciences (8).

**Red Squirrel.**

*Tamiasciurus hudsonicus.*— Distributed in comparatively small numbers throughout the park. At Glacier it was seen, heard, or its presence determined by the finding of feeding places, from the heavy forests in the valleys to the sub-alpine zone at 6000 feet and higher. Seeds from the season's cones of alpine fir appeared to be the chief food; some places in the woods, on fallen logs, on stumps and under large trees, were strewn with the debris from countless numbers of cones which had accumulated through several seasons.

I am informed that in British Columbia royalties were paid on 500,000 squirrels trapped during 1941. It is of interest to note that in some districts, from which large numbers were taken, for example, Lac La Hache Valley, the population in 1942 appeared to be equal to, or in excess of, the population at Glacier.

**Flying Squirrel.**

*Glaucomys sabrinus.*— Reported to occur throughout the district. None was seen by me and attempts at securing specimens in traps were not successful. The type of *Glaucomys sabrinus latipes* Howell was collected at Glacier; the specimen is in the United States National Museum (6).

**Beaver.**

*Castor canadensis.*— Occurs only in the Beaver River Valley where it is reported to live in dens in the banks of the river. On the Beaver River meadows are several old dams and lodges that have been deserted for many years. Reports indicate that the population is much smaller than was the case prior to the construction of the railroad.

**White-footed Mouse.**

*Peromyscus maniculatus.*— Abundant in almost all types of habitat at Glacier. A total of 22 adults and young was trapped. Reference in literature to six specimens *Peromyscus maniculatus artemisiae* (Rhoads) in United States National Museum (15). Lately the race *alpinus* has been described by Cowan and the present specimens are assigned to this new form.

**Bushy-tailed Wood Rat.**

*Neotoma cinerea.*— Occurs throughout the park and is mentioned by several of the early visitors who wrote of their experiences. As elsewhere, it is given to frequenting deserted buildings. Reference in literature to two specimens *Neotoma cinerea drummondi* (Richardson) in United States National Museum (3).

**Lemming Mouse.**

*Synaptomys borealis.*— The type of *Synaptomys borealis chapmani* Allen was collected at Glacier. The specimen is in the American Museum of Natural History (11). No other evidence of its presence in the park was obtained.

**Rocky Mountain Phenacomys.**

*Phenacomys intermedius.*— One specimen of *Phenacomys intermedius intermedius* Merriam taken at Glacier is in the collection of the American Museum of Natural History (10). Old runways in the heather on Mount Abbott, believed to have been made by this species, were examined. Intensive trapping at high altitudes is necessary to determine its status in the park.

**Red-backed Mouse.**
*Clethrionomys gapperi.*— Four adult females, one adult and one young male were trapped in the spruce woods; runways were beside and under mossy logs and under stumps in dry situations. The American Museum of Natural History collection includes 10 specimens taken at Glacier.

**Meadow Vole.**
*Microtus pennsylvanicus.*— Two adult males, two young males, one adult and one subadult female were trapped in grassy places in the open. In none of these situations were runways observed. This vole apparently has a more limited distribution in the park than has *Microtus mordax*. The subspecies represented is *Microtus pennsylvanicus drummondii.* (Audubon and Bachman).

**Long-tailed Vole.**
*Microtus mordax.*— Trapped along small running springs, in patches of rhododendron, in spruce woods and in a small patch of grass frequented by *Microtus pennsylvanicus*. Reference in literature to three specimens in United States National Museum (1).

**Rocky Mountain Jumping Mouse.**
*Zapus princeps.*— Results of trapping indicated a fairly large population; specimens were taken in the spruce woods, in brushy thickets, in open grass patches and on the shore of Black Lake. Reference in literature to one specimen in United States National Museum (17).

**Yellow-haired Porcupine.**
*Erethizon epixanthum.*— Distributed throughout the park. At 8.00 p.m. on August 8, 1942, one was seen feeding on the blossoms of fire-weed that grew on a steep slope. To secure these it grasped the stems in its fore-paws and pulled them downward so that they broke or bent at right angles. It first ate the blossoms lowest on the stalk and then worked towards the tip. When all the blossoms were eaten the end with the terminal buds was manipulated by means of the fore-paws so that it could be taken tip first into the mouth.

**Pika.**
*Ochotona princeps.*— Established and fairly common in many rock slides up to and above timberline. A small population inhabited the rocks amongst the ruined snowsheds in Rogers Pass. One food store at that place contained fire-weed, everlasting, raspberry leaves, mountain alder leaves, grass and a few green twigs of spruce. Reference in literature to three specimens *Ochotona princeps cuppes* Bangs in Philadelphia Academy of Sciences and three specimens in the United States National Museum (7).

**Snowshoe Hare.**
*Lepus americanus.*— No evidence of the presence of snowshoe hares was observed at Glacier. However it is reported to occur there and, more abundantly, in the Beaver River Valley.

**Wapiti.**
*Cervus canadensis.*— According to the information submitted by park wardens, wapiti first appeared in the park in Beaver River Valley about 1936. The population is said to be resident and increasing and now numbers approximately ten.

**White-tailed Deer.**
*Odocoileus virginianus.*— According to report submitted by Warden Martin, District No. 2 is the summer range for approximately 75 white-tailed deer. They arrive in April, before the fawns are dropped, and the majority leave in September for the winter range in the Columbia River Valley. The greater number spend the summer in the Beaver River bottom and the remainder on higher levels. The population in the winter of 1941-42 was estimated to be six.

**Mule Deer.**
*Odocoileus hemionus.*— District No. 3 is a summer range for a population of mule deer estimated to number approximately 50. Bucks and does, accompanied by fawns, come into the district in late spring by way of the Spillamacheen River and follow the receding snow up the slopes of Bald Mountain. In the fall they return to the Columbia River Valley by the same route. In 1941-42 approximately six wintered on a bench at 3500 feet altitude between Grizzly Creek and Stony Creek. It is quite scarce in District No. 1 and reports of animals, or tracks, being seen refer to Rogers Pass only.

**Moose.**

*Alces americana.*— There is said to be a resident population in the Beaver River Valley estimated to number six in 1941. A report that one was seen in Rogers Pass, July 25, 1942, has been questioned.

**Mountain Caribou.**

*Rangifer montanus.*— Wheeler (18) states that in October, 1902, caribou were plentiful and mentions seeing several herds in the parklands on the southern portion of Bald Mountain.

At present there is said to be a population of approximately 30 in District No. 2. In spring and early summer it is reported to frequent the Beaver River meadows and other adjacent areas on the lower levels. In midsummer a movement to the alpine meadows takes place and the majority winter in the alpine fir on Bald Mountain at approximately the 5000 foot level. A small number winter near the headwaters of the Beaver River.

Reports regarding a herd in District No. 3 suggest that the population there is of similar proportions. It is said to range between Flat Creek, Bostock Creek and the west boundary of the park. Several observers report that one bull represents the population in District No. 1. The tracks of this animal have been seen in winter in the Asulkan Valley. Reports made by the late Warden Hartley of larger numbers in District No. 1 have been questioned. Winter browse as observed by the wardens is said to include alpine fir, hemlock and tree moss, *Usnea* sp.

It seems probable that a large proportion of the Selkirk population is resident within the park and that the migrations are not extensive. There is a crossing on the Illecillewaet River near Albert Canyon and at that place a number of animals, probably moving out of the park, have been killed in past years. No recent information concerning this point is available but probably at no time did a large number use this crossing. It is reported that few calves are seen and this with other evidence suggests that the population is static, as is the case with certain isolated herds of mountain sheep elsewhere in British Columbia. In the case of the caribou, it is apparently subject to little loss through predation and the number shot during their wanderings outside the park is known to be small.

**Mountain Goat.**

*Oreamnos americanus.*— Undoubtedly less abundant than formerly in the more travelled sections of the park. Wheeler (18) writing of a trip in the Glacier region in 1902, mentions seeing five adults and two kids on Cougar Mountain and reports it as frequently seen on the south side of Asulkan Pass. Warden Mann reports counting 20 from Rogers Pass in 1931. A total of seven was seen there one day in 1941. The present population in District No. 1 is reported to be approximately 50. The park wardens believe that goats avoid the ridges occupied by grizzly bear, also that a decline in the numbers of goat coincided in time with an increase in the numbers of grizzly bear. In recent years few goats have been seen in the immediate vicinity of Glacier. Skiers travelling over the neves in spring report seeing one or two on various local ridges but it is certainly not abundant locally and for the most part restricted to the least accessible terrain.

In connection with District No. 2 the warden reports that the chief goat range is on the Dogtooth Mountains both in and out of the park. Fourteen were counted in one day in 1941. A number is said to frequent the west slope of Fidelity Mountain in District No. 3, but no estimate of the number composing this population is available.

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# CURRENT LITERATURE

EMERGENCY FOOD IN ARCTIC CANADA. *By A. E. Porsild, National Museum of Canada. Special Contribution 45 - 1, pp. 20, 1945 (Mimeographed).*

Porsild has lived many years in the north and though a botanist has a wide knowledge of Arctic mammals. His first-hand knowledge is reflected in this practical summary that was prepared in response to a request from the Royal Canadian Air Force.

Northern Canada is not an easy country in which to live off the land. To get in touch with natives is the first advice given, and, when it is mentioned that even such experts in woodcraft as Indians may suffer famine, the difficulties confronting an inexperienced, hungry white man suddenly facing the wild, are obvious.

The importance of animal foods is stressed, the main ones listed, and methods of taking them given. The chief plant foods are listed and characterized. Not only are plant foods less important but they are available for but a limited period. No truly Arctic plants are poisonous, but at least one mushroom and one berry of the subarctic are poisonous.

—A. L. RAND.

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